Rhetoric vs. Reality, Part II: Assessing the Impact of New Federal Red Tape on Hydraulic Fracturing and American Energy Independence

Testimony of
Michael L. Krancer
Secretary
Commonwealth of Pennsylvania
Department of Environmental Protection
Before the United States House of Representatives
Committee on Oversight and Government Reform,
Subcommittee on Technology, Information Policy, Intergovernmental Relations and Procurement Reform
Thursday, May 31, 2012

Members of the Committee, thank you for the opportunity to provide testimony on behalf of the Commonwealth of Pennsylvania, Department of Environmental Protection.

I have been asked to address how Pennsylvania's environmental protection programs oversee and regulate the exploration and extraction of natural gas to ensure that the activity is done in an environmentally sensitive way. Suffice it to say that Pennsylvania's programs are comprehensive and robust and they are working. The outside experts agree on that.

I have also been asked to say a few words about the newest federal forays into regulation of hydraulic fracturing, namely the draft EPA Permitting Guidance for Oil and Gas Hydraulic Fracturing Activities Using Diesel Fuels and the Department of the Interior's Bureau of Land Management's (DOI BLM) draft regulations for fracking on federally managed or Indian lands.

There is no question that states can do and are doing a better job regulating the oil and gas extraction technique of hydraulic fracturing within their borders than the federal government could do. No "one size fits all" is applicable in this field. Each state is different and has different geography, topography, geology, hydrogeology and meteorology. In fact, the states in which hydraulic fracturing has and is taking place have been regulating that activity for many years already. The states are light-years ahead of the federal government in terms of experience and know how about their own individual states and about the science and technique of hydraulic fracturing.

Pennsylvania's natural gas extraction has dramatically increased over the past few years and we are delivering huge amounts of cheap clean fuel to Americans because of our ability to know our state and regulate and oversee the safe conduct of this activity within our state better than anyone. The Energy Information Administration reported on May 23, 2012 that natural gas production in Pennsylvania has quadrupled since 2009 averaging now nearly 3.5 billion cubic feet per day in 2011. See

DIM0125001 DIM0125001

http://www.eia.gov/todayinenergy/detail.cfm?id=6390. A copy of the dramatic chart from the EIA is attached as an Exhibit.

This has, in turn, resulted in what PJM, the largest competitive electric power grid operator covering 13 states and the District of Columbia from New Jersey to Illinois and over 51,000,000 consumers, has called a massive increase in future gas powered electricity generation. In fact, the PJM capacity auction of May 2012 cleared nearly 5 gigawatts (GW) of new gas fired generation capacity. Low gas and electric utility rates for consumers is only one side of the story. The promise for the future is even brighter as this and other domestic energy sources can unlock an economic renaissance that America can lead.

I can tell you unequivocally that the federal government could not have implemented and executed what we have done, and done very well, right here in Pennsylvania.

I was encouraged to hear that EPA Administrator Lisa Jackson said to an audience at Richard Stockton College of New Jersey in February 2012 that states are right to take the lead on the issue of regulating hydraulic fracturing and that regulation of hydraulic fracturing does not need to be federalized. However, it seems that EPA's actions and attitude recently have not been consistent with its Administrators words. Also, other parts of the federal administration have sought to interpose on the state's role as primary regulator of natural gas exploration and extraction via hydraulic fracturing.

This perceived need to layer federal regulation on top of an already comprehensive state regulatory program is completely unfounded. I say unfounded because both the federal government and independent, impartial organizations have concluded that states, and Pennsylvania in particular, are appropriately and professionally managing this important industry.

Indeed, the head of EPA's Drinking Water Program said publicly in 2010 that "I have no information that states aren't doing a good job already [regulating fracking]." That is certainly the case for Pennsylvania. Also, our regulatory program was recently evaluated by the independent, non-profit, multi-stakeholder State Review of Oil and Natural Gas Environmental Regulations organization (STRONGER) and received positive marks. STRONGER was recently recognized by the United States Department of Energy Shale Gas Subcommittee's August 2011 draft report on Shale Gas development as an "exceptionally meritorious" mechanism for improving the availability and usefulness of shale gas information among constituencies. According to STRONGER, "the Pennsylvania program is, over all, well-managed, professional and meeting its program objectives." I would go beyond that and say that Pennsylvania has done an exceptional job managing the new challenges that shale gas development presents while allowing our citizens to enjoy the enormous benefits created by this industry.

On May 15, 2012, the State University of New York at Buffalo's Shale Resources and Society Institute released a comprehensive study which found that Pennsylvania's

program and regulations have been quite effective at reducing the impacts per well drilled and that there is a compelling case that Pennsylvania state oversight of oil and gas regulation has been effective. The SUNY Buffalo study was extremely comprehensive and considered the period of 2008, when unconventional gas exploration was in its early stages in Pennsylvania, through mid-2011. The study found, among other things, that environmental incidences declined 60 percent between 2008 and August 2011. This, says the report, is "a rather notable indicator of improvement by the industry and oversight by the regulators." A copy of the SUNY Buffalo Study is attached hereto as an Exhibit. This, of course, reinforces, confirms and brings forward in time the conclusions of the 2010 STRONGER report which, as mentioned before, concluded that the Pennsylvania program is well-managed, professional and meeting its program objectives.

One of the primary areas of concern which has been raised about state regulation is in the area of groundwater and drinking water protection. There has been a misconception that the hydraulic fracturing of wells can or has caused contamination of water wells. This is false. First, hydraulic fracturing is only a temporary feature of natural gas development which lasts a few days. Hydraulic fracturing of wells is not new in Pennsylvania; it has been going on here since about the 1950s and has been standard practice since about the 1980s. Tens of thousands of wells have been hydraulically fractured in Pennsylvania without any indication that groundwater quality has been impacted.

Our decades of successful state experience is backed up by federal claims as well. In 2010, the head of EPA's drinking water program, Steve Heare, said that despite claims by environmental organizations, he had not seen any documented cases that the hydro-fracking process was contaminating water supplies. EPA Administrator Lisa Jackson said the exact same thing in her May 24, 2011 testimony before the U.S. House Committee on Oversight and Government Reform. In a January 2010 article in Platts Gas Daily, Energy Secretary Steven Chu said that hydraulic fracturing is safe and lawmakers should be cautious in their efforts to restrict it. My predecessor, former DEP Secretary John Hanger, told Reuters in October 2010 that "Pennsylvania has not had one case in which the fluids used to break off the gas from 5,000 to 8,000 feet underground have returned to contaminate groundwater."

Dimock, Pennsylvania has become somewhat of a center of attention with respect to natural gas exploration and state/federal relations. Even the original May 2011 limited Duke Study of Dimock, Susquehanna County, water sample reports confirmed there was no evidence of fracking fluids in any sample from any of the 68 wells they tested. The study states, "[w]e found no evidence for contamination of drinking-water samples with deep brines or fracturing fluids." And, more recently, from about January 2012 to May 2012, the federal EPA has conducted its own testing of private water supply wells in Dimock. EPA has conducted four rounds of sampling covering 61 homes. Each sampling result showed no levels of contaminants which would pose a health threat or as EPA put it, "the results gave no cause for either 'immediate' or 'further action.'"

Our ability to unlock the huge clean burning energy source contained in unconventional shale formations has transformed Pennsylvania into an energy exporter and will

ultimately move our nation toward energy self-sufficiency. In addition, we are looking at an economic and energy transformation. We have already seen tens of thousands of new jobs here in Pennsylvania from the industry itself as well as from new industries spawned to support it. These are good paying career jobs in many fields. And that is just the start. There will be hundreds of thousands more good paying skilled and unskilled jobs in a variety of sectors.

Oil and natural gas exploration and extraction have already provided huge economic benefits to Pennsylvania and the promise for the future is immense. Not only the promise of cheap clean fuel but also a key to the renaissance of the American petrochemical industry as well. Shell Chemicals in June announced that it is developing plans to possibly build a world-scale ethylene cracker with integrated derivative units in the Marcellus Shale region of Pennsylvania in Monaca, Beaver County. The cracker processes ethane from natural gas into ethylene, one of the primary inputs for a host of everyday products. It is no coincidence that Shell is looking right here in Pennsylvania to possibly build that cracker plant. As Shell said, "US natural gas is abundant and affordable."

This story is not limited to southwestern Pennsylvania. In the Philadelphia area we are also seeing that Pennsylvania's and our nation's oil and natural gas resources may hold the key to reinvigorating one or more of our southeastern Pennsylvania refineries and/or the petrochemical industry. The crude oil from the Bakken Shale formation in the Midwest may provide the game-changer which turns the Philadelphia refinery's economics around saving thousands of jobs. Also, Energy Transfer Partners' recent acquisition of Sunoco – coupled with a strong statement on its commitment to Marcellus Shale-related activity – is another tangible example of this opportunity benefiting southeastern Pennsylvania.

While interest in the economic and energy possibilities of the Marcellus is high, my job is to protect public safety and the environment and to do so based on sound science and not fiction or fear. Unfortunately, we have seen some examples of very suspect science lately in this area. There are many examples but let me point out four prominent ones: (1) the May 2011 Duke University Paper regarding methane in Pennsylvania water wells in Dimock; (2) the April 2011 Robert Howarth Paper regarding Greenhouse Gases and Marcellus Shale; (3) the April 16, 2011 United States House of Representatives Democrats Report, "Chemicals Used In Hydraulic Fracturing" and; (4) EPA's *Greenhouse Gas Emissions Reporting From The Petroleum and Natural Gas Industry: Background Technical Support Document*, 2010.

Our experts as well as other experts are studying all these materials, and I will not belabor all the deficiencies with these various reports here but I will highlight a few.

The Duke paper seems to be based on only a few selected samples in a specific area with previously documented problems, i.e., Dimock Township in Susquehanna County, Pennsylvania. This would indicate that the study itself is statistically and technically biased. Also, the fact is that the methane in the area being seen is the product of the

shallower, Upper Devonian formation which is about 1,000 to 3,000 feet deep, not the deeper shale formations which are about 7,000 feet deep. Yet the Paper improperly attempts to link the source to the deeper Marcellus Shale. The authors of the study have inexplicably declined DEP's reasonable request that they share with us their data and their sample locations. Moreover, the authors of the Study have indicated their personal bias. They have gone on record in the *Philadelphia Inquirer* as being personally ideologically opposed to domestic natural gas drilling saying "we would like to see shale gas drilling become largely unnecessary". These factors especially raise credibility questions. DEP is always willing to partner with disinterested scientists or institutions whose goals are to obtain facts but we are justifiably wary of those who admit that they are personally committed to showing "what we would like to see."

In October 2011 the Center for Rural Pennsylvania issued its comprehensive study entitled "The Impact of Marcellus Gas Drilling on Rural Drinking Water Supplies". The Center is a bipartisan bicameral legislative agency of the Pennsylvania Legislature. The study was conducted by the Penn State University's College of Agricultural Science. Major findings of the Study include the following:

- Statistical analyses of post-drilling versus pre-drilling water chemistry did not suggest major influences from gas well drilling or fracking on nearby water wells.

- Analyses of the data from both phases of this study generally showed a lack of statistically significant changes in water quality parameters due to Marcellus drilling or fracking when comparing pre- to post-drilling elements of water quality.

- In contrast to the Duke study's findings, here dissolved methane did increase at one drilled site but this site also had a moderate level of methane before drilling occurred. Dissolved methane did not increase at fracked sites and was not correlated to the distance to the nearest Marcellus well site.

- Regarding methane, the research found no statistically significant increases in methane levels after drilling and no significant correlation to distance from drilling.

- Statistical analyses did not suggest major influences of gas well drilling on the water quality of nearby water wells, as evidenced by a lack of statistically significant increases in pollutants that are most prominent in drilling water fluids, such as total dissolved solids (TDS), chloride, sodium, sulfate, barium and strontium.

- Results of the water quality parameters measured in the study did not indicate any obvious influence from fracking in gas wells nearby private water well quality. Data from a limited number of wells also did not suggest a negative influence of fracking on dissolved methane in water wells.

Also, the EPA announced in January 2012 that it had decided to step in and take water samples in Dimock. EPA released on or about May 11, 2012 the results of its fourth and final round of water testing. EPA said that the results of its fourth were the same as the results of the first three rounds and that is all rounds of samples show no health concerns.

The United States House of Representatives Democrats' April 16, 2011 paper fails to state what it is not. It is not a toxicological review of chemicals used in fracking and it does not provide a sound scientific assessment of exposures, exposure pathways or risks to human health that might be associated with such theoretical exposure. The paper also fails to note that the fluid that is its subject is over 98% water and sand with only small amounts of the chemicals it attempts to characterize. The paper creates misimpressions by focusing on total liquid volumes and not the amounts or volumes of any additives in the liquid. The paper also is very loose with respect to its use, or misuse, of the label "carcinogen."

Robert Howarth is a Cornell University scientist who published a "study" regarding the greenhouse gas impacts of shale gas development. Howarth's supposed study has been rejected by almost every legitimate source in the scientific community. Even Howarth himself admits that the data in his study is, his words, "limited", "unpublished", "really low quality", "lousy" and from "weird PowerPoints." Joe Nocera of the New York Times points out that even the Environmental Defense Fund has estimates of methane gas emissions that are 75% lower than Howarth's.

In August 2011, Carnegie Mellon University (CMU) published a study, partially funded by the Sierra Club, which demonstrates conclusively that Howarth's conclusions are false, irresponsible and unscientific. The CMU study is a comprehensive life cycle analysis which concludes, among other things, that "natural gas from the Marcellus Shale has generally lower life cycle greenhouse gas (GHG) emissions than coal for production of electricity" and that "natural gas provides lower greenhouse emission for all cases studied whether the gas is derived from Marcellus shale or the average 2008 domestic natural gas system" Also, interesting is that the CMU study concludes that although "green completions" and capturing gas for market that would otherwise be flared or vented could reduce emissions associated with the completion process, "these preproduction emissions, however, are not substantial contributors to the life cycle [emissions] estimates." As lead CMU researcher Paulina Jaramillo said, "we don't think [Howarth] is using credible data and some of the assumptions [Howarth] makes are biased. And the comparison [Howarth] makes at the end, my biggest problem, is wrong."

The fundamental deficiencies of EPA's *Greenhouse Gas Emissions Reporting Technical Document* were recently very well documented in an August 2011 report released by the very well respected energy consulting firm IHS CERA entitled, aptly, "*Mismeasuring Methane: Estimating Greenhouse Gas Emissions From Upstream Natural Gas Development*. The EPA's 2010 *Technical Guidance* inexplicably revised upward by an order of magnitude the prior emissions estimates for GHGs from this industry from studies on this topic from just a few years ago. IHS CERA explains the magnitude of the flaws in EPA's approach. As IHS CERA points out, EPA's methodology behind its

2010 study lacks rigor and should not be used as a basis for analysis or decision making. EPA, strangely, based its estimates on methane emissions from well completions from data samples of methane captured (i.e., not emitted) during well completions. Also, EPA based its conclusions on just a couple of slide presentations. Aside from the fundamental deficiency of using incomplete and unreliable data, IHS CERA points out that EPA did not even do the math correctly with the data it did choose to use and that EPA's assumptions in doing the math were unsupportable in the real world. As a result, "the overall amount of methane that EPA assumes is emitted during well completion activities does not pass a basic test of reasonableness."

This Report would seem to confirm that life cycle GHG emissions from unconventional shale operations are similar to current domestic gas operations and that natural gas, as a fuel, presents tremendous opportunities to achieve cleaner air since it emits virtually no particulate matter and much lower amounts of other parameters.

The IHS CERA Report also discusses the Howarth Report. IHS CERA shows, to the extent any further showing on this were necessary, that the Howarth Report is not technically or factually supportable. Indeed, appended to the IHS CERA report is a piece by an IHS CERA principal, Pete Stark, that specifically takes Howarth to task for "misusing and seriously distorting" a previous IHS CERA article published by Mr. Stark. The release of the CMU Study and the IHS CERA Study in such close proximity in time prompted a colorful remark by my immediate predecessor as DEP Secretary, John Hanger, who had this to say, "bit by bit the Howarth Study is being consigned to the junk heap."

The Myths About the So-Called "Halliburton Loophole" and the FRAC Act

Since an overarching topic here today is state versus federal regulation of hydraulic fracturing, let me take a few minutes to discuss some context and history. Much of the discussion about the state/federal relation in the area of regulation of hydraulic fracturing has as its focus the so-called, but misnamed, Halliburton "loophole". While some say that the so-called Halliburton Loophole is behind what they perceive as a sinister plot to exempt fracking from the Safe Drinking Water Act (SDWA) and allow the pollution of drinking water, the facts are different.

First the context. Fracking is a temporary process of pumping fluids underground for the purpose of extraction of natural gas or oil from deep formations. Indeed, the initial fracking process lasts a only few days and while the well may have to be periodically re-fractured, the life span of a producing well can be a century. In addition, the fracking process is separate and apart from the drilling process. In fact, the fracking process, by definition, occurs after the drilling of the well is complete. Also, fracking happens very deep below the surface. For Marcellus formations, this occurs at about 5,000 to 8,000 feet below the surface or more. Fresh groundwater, on the other hand, is located from about less than 600 feet below the surface.

Now the history. Hydraulic fracturing has never been regulated by the federal government. It has always been a matter of state regulation. EPA has never intended or thought that fracking is or should be subject to the SDWA's Underground Injection Control (UIC) program. It has never before even expressed an interest in regulating the generations-old practice of energy extraction *via* hydraulic fracturing under the SDWA UIC program. Instead, EPA, before now, has always been of the mind that the practice was well regulated by the various states in which it was taking place.

In 1997, a court case from the federal appeals court for the Eleventh Circuit issued an opinion involving the state of Alabama, while not finding that fracking was any threat whatsoever, for the first time ever, said that underground emplacement of fluids for the purpose of extraction of gas from coal beds, which are quite shallow compared to Marcellus and other unconventional gas bearing formations, was subject to the federal UIC program. The aberrational case was not binding nationwide; only in the territory governed by that federal court. In response to this court decision, EPA studied the fracking process and it issued a report in 2004 which concluded that fracking poses little or no threat to drinking water. EPA also concluded then that no further study of this process was scientifically justified.

Just like EPA, the United States Congress has never intended that hydraulic fracturing should be subject to the SDWA's UIC program. So, in 2005, in the face of the aberrational court decision from the Eleventh Circuit, Congress sought to reassert and reaffirm, through the bipartisan Energy Policy Act of 2005, what had always been its policy, *i.e.*, fracking for energy extraction was not regulated federally by the SDWA's UIC program.

It is myth to assert that this was pushed solely by Vice President Dick Cheney. In fact, this provision of the Energy Policy Act of 2005 garnered bipartisan support. It won 74 yea votes in the Senate. Included among its supporters there was Ken Salazar, the current Secretary of the Interior who was then a Senator from Colorado and the current President of the United States, Barak Obama, then the junior Senator from Illinois. In the House, 249 members on a bipartisan basis voted for the Bill including the top Democrat members of both the Energy and Commerce and Natural Resources Committees.

Now for the facts about drinking water and surface water protection. The Energy Policy Act of 2005 has no impact whatsoever on the state and federal laws that prohibit oil and gas extraction operations from causing surface water or ground water pollution. The whole of oil and gas operations are subject to the federal Water Pollution Control Act and is prohibited from causing pollution to the waters of the United States. In Pennsylvania, all aspects of oil and gas exploration and extraction, including drilling and fracking operations, are regulated by the state's Oil and Gas Act, the Clean Streams Law, Air Pollution Control Act, Solid Waste Management Act, and the Dam Safety and Encroachment Act and our water protection regulations. Pursuant to these laws, pollution of groundwater and surface water resources by well drilling and completion is completely prohibited, The fact is that the so-called and misnamed "Halliburton

Loophole" in no way diminishes the statutory and regulatory coverage of our laws as applied to gas extraction.

Hazardous chemicals are not being injected into the drinking water as some say. As mentioned, hydraulic fracking occurs at great depth; about 5,000 to 8,000 feet in Pennsylvania. Fresh groundwater is located a few hundred feet below the surface. So the activity occurs thousands of feet of solid bedrock below where water aquifers are located. Also, fracking fluid is comprised of on average 99.51% water and sand. The rest are components in common everyday uses such as food additives and cosmetics. As a Harrisburg newspaper story succinctly described this false paradigm recently,

> Industry representatives say the chemicals are the same as you'd find under your kitchen sink, but Surra said "You don't want to take the stuff from under your kitchen sink and mix it in a glass of water you're going to drink, and that's basically what's going on." But it's not.

'*Citizens Shale Commission' Weighs In On Marcellus Policy*, Harrisburg Patriot News, Monday October 24, 2011 (emphasis added).

In conclusion, the case for the FRAC Act or federal regulation of hydraulic fracturing has not been made. In fact its proponents neglect, forget or misrepresent the history behind the relationship between fracking and the SDWA UIC program. They fail to mention or account for the fact that the current President of the United States and current Interior Secretary supported the Energy Policy Act of 2005 and that never before the appeals court case did either the Executive or the Legislative Branch intend or assert that fracking for energy extraction was within the SDWA UIC program. Also, the FRAC Act has nothing to do with potential contamination of drinking water supplies. The FRAC Act does not deal with well construction, cementing and cementing practices. Pennsylvania's state regulations do that.

Before I talk about Pennsylvania's programs, let me briefly address the topics of the draft EPA Permitting Guidance for Oil and Gas Hydraulic Fracturing Activities Using Diesel Fuels and the Department of the Interior's Bureau of Land Management's draft regulations for fracking on federally managed or Indian lands.

EPA's Draft Diesel Fracking Guidance Raises Serious Questions About States' Primacy—Mission Creep and Redundancy For No Environmental Benefit

This is really a story of regulatory mission creep, redundancy of regulation, adding regulatory uncertainty and, substantively, trying to fit a square peg into a round hole all for no environmental protection benefit that will detrimentally impact our nation's ability to obtain domestic sources of energy at a time in which we need those resources more than ever. The draft Guidance is very broad and covers topics such as public notice processes, monitoring, pressure testing and well casing and cementing requirements.

It is important to note at the outset that the SDWA UIC program was developed and is operated with respect to underground injection of fluids for storage and disposal. It was not designed to cover natural gas or oil production well activities. Pennsylvania has very little underground injection for storage or disposal. Primarily for this reason Pennsylvania has not sought primacy for the UIC program and EPA issues the permits, to the extent there are any, for the UIC storage and disposal activities.[1] Also, we do not believe that operators are commonly using diesel fuel for hydraulic fracturing for production in Pennsylvania. So, the Draft Diesel Fracking Permitting Guidance may not have a very large impact on Pennsylvania. However, the guidance does pose a back-door challenge and threat to the states' regulation on hydraulic fracturing and could lead to very detrimental results.

The federal government does retain the legal authority to regulate hydraulic fracturing for natural gas and oil production if diesel fuel is used in that process. That was the one entry point spelled out in the 2005 Energy Policy Act which, as I have discussed, affirmed the longstanding law and policy that the federal Safe Drinking Water Act and the federal government did not intend to regulate hydraulic fracturing for natural gas or oil production.

The entire enterprise the EPA has undertaken here leads to some well-placed suspicion about its motives. One has to ask why the federal government would want to interpose itself here as the states in which hydraulic fracturing is happening are doing a good job doing so and are light-years ahead of the federal EPA on this in terms of time, experience and know-how. Also, what information does EPA have which shows that industry is routinely using diesel fuel for fracking? This leads to some serious questions why the federal government would be spending its limited time and resources going down this path and where this "draft" Guidance will end up as a final one.

During the drafting process there were reports that some EPA staffers were vocal that the definition of "diesel fuel" should be very broad. Their theory was since diesel contains "BTEX" compounds (i.e., benzene, toluene, ethyl benzene, and xylenes) that any hydraulic fracturing activity which contains any amount of any of these materials should be defined as diesel fuel. Thus, the Energy Policy Act's limited exception for fracking with diesel fuel would be swallowed entirely by EPA regulatory fiat and virtually all production fracking would be covered by federal regulation. This would be of doubtful legality and would certainly be challenged in court, the draft guidance does not go that far. However this is just a draft guidance and one of the topics EPA is seeking comment on is how to define "diesel fuel."

On a more basic level, as mentioned earlier, the SWDA UIC program is a storage and disposal well program. It is not and never has been a natural gas or oil production well program. So you have the anomaly of transposing storage and disposal well requirements onto a production well overlay. This is trying to fit a square peg into a round hole. This is already proving problematic. For example, the draft guidance recommends that the area

[1] Other states in which EPA has primacy over the UIC program and EPA issues the permits for such activities are New York, Kentucky and Tennessee.

of review (AOR), which is basically the area governed by the permit, be radically expanded from the one-quarter mile generally used in the UIC program to a radius that covers the entire length of a horizontal fracture which could be several miles. That makes little sense based on the science of hydraulic fracturing.

Then there is the more subtle but very pernicious specter of federal pre-emption which threatens states that do have primacy over their UIC storage and disposal programs such as North Dakota, Texas, Wyoming, Colorado, Montana, New Mexico and Oklahoma. These states have very robust state regulation of oil and gas exploration and extraction activities. There is the prospect that EPA could in the future threaten those states' primacy if it were to find that the states' programs were not exactly like EPA's program for diesel fuel fracking. In addition, in those states, there is the prospect that EPA's "square peg" storage and disposal UIC standards would creep over into the "round hole" of production well standards regulation. There is not a good fit and safe and environmentally sensitive domestic energy production in those states could be choked off by regulatory overkill and uncertainty.

DOI's BLM Proposed Rules On Fracking—Mission Creep and Duplication Again

Pennsylvania will not be directly impacted by these rules as we have no BLM managed lands or Indian lands. However, as with the draft permitting guidance discussed already, the larger question is the federal attempted overlay on what the states are already doing. Much of the attention on the BLM proposed rule deals with chemical disclosure. We already have in Pennsylvania one of the most aggressive chemical disclosure laws in the nation which I will talk about in more detail later. I would imagine that many states in which fracking takes place and there is BLM or Indian lands would say the same. In fact, the Governor of Colorado, John Hickenlooper, himself a geologist, noted that "Bureau of Land Management modeled its disclosure requirements for fracturing fluids after the Colorado rule". Governor Matt Mead has observed that Wyoming's is "well ahead" of the BLM on regulation of hydraulic fracturing. He noted that Wyoming has had chemical disclosure rules in place since 2010 and that the Wyoming law is more rigorous than what BLM has proposed. Governor Mead went on to say that we want the states to be in a position to be proactive and agile on these and it is a disincentive to do so when the federal government steps in and says we are going to have a cookie-cutter approach. We agree with both Governor Hickenlooper and Governor Mead on this.

Indian tribes reacted quite skeptically. Fred Fox, the energy administrator for three Indian nations in North Dakota (the Mandan, the Hidatsa and the Arikara nations) observed that the BLM proposal is downright unwelcome on a number of levels. Mr. Fox sees the shale play as a newfound source of possibility for his economically challenged North Dakota community. The new BLM proposed rules, though, would be a hurdle and an unnecessary intrusion into that. He said that the proposed regulations are redundant as "the regulations try to come in and put a layer of control over what the tribes are trying to do." On a broader level, Mr. Fox's view is that the federal intrusion is a step backwards from American Indian sovereignty and a breach of the policy that the federal government should consult with the Nations on decisions that affect them.

Interestingly, those views parallel the view of many states with respect to the federal government's intrusion into the states' arena with respect to regulation of hydraulic fracturing.

The other topics covered in the BLM proposed rule, well construction standards and water management plans, are also already being done in Pennsylvania. So Governor Mead's point about Wyoming is applicable here too; we are already well ahead of the federal government on regulation of hydraulic fracturing.

At the end of the day we have duplicative regulatory requirements that add nothing to environmental protection and serve only to increase regulatory uncertainty and burden. That will only serve to hinder oil and natural gas exploration and for no environmental protection reason. This seems like regulation for the sake of regulation.

Pennsylvania's Regulatory Program

Simply put, because of our long history of oil and gas development and comprehensive regulatory structure, Pennsylvania does not need federal intervention or a federal overlay to ensure that this activity is being done in an appropriately protective manner. In fact, as I have mentioned, only the state could have implemented the programs we have in place now and only the state can be responsive, flexible, agile and knowledgeable enough about conditions and circumstances on the ground here in Pennsylvania to adjust programs when adjustment is called for.

Pennsylvania regulates oil and gas well operations under several statutes including the Oil and Gas Act of 2012, the Clean Streams Law, the Air Pollution Control Act, the Dam Safety and Encroachments Act and the Solid Waste Management Act. As described in more detail to follow, this network of laws and their associated regulations provides the Department of Environmental Protection (DEP) with the tools it needs to comprehensively regulate everything associated with oil and gas development - from locating the well site, site preparation, drilling the well, fresh water withdrawals and water storage, wastewater management, and site restoration.

I will talk about our program in much more detail later. However, an overview is helpful at this point. We have regulations governing well construction, i.e., cementing and casing rules. Those are our so-called Chapter 78 regulations. We have regulations governing surface aspects of natural gas exploration and development as well. That would include water disposal rules which prevent untreated flowback water from being released into our surface waters. Those are our Total Dissolved Solids regulations which are codified in Chapter 95. We have rules and regulations governing site development to control erosion and sedimentation. There are rules regarding surface storage and impoundment as well as centralized flowback impoundments. We have undertaken an initiative at DEP to encourage the use of non-freshwater for fracking including the use of Abandoned Mine Drainage water. We also have a long history of air regulation in Pennsylvania and we have regulated air emissions aspects of oil and gas development for a long time.

With respect to surface and drinking water protection, Pennsylvania has shown it is ready, willing and able to act in other important, agile and decisive ways. On April 19, 2011, at the direction of Governor Tom Corbett, I called on all Marcellus Shale natural gas drilling operators to cease by May 19 delivering wastewater from shale gas extraction to 15 facilities that then accepted it under an exemption from being covered by the 2010 Total Dissolved Solids (TDS) regulations. The next day the industry publicly stated its commitment to compliance. From what we can see today a dramatic sea change has occurred in Pennsylvania on this as we have virtually overnight gone from millions of gallons being delivered to those facilities and discharged to virtually none. Our latest data is a dramatic demonstration of success. For the first six months of 2011, 1.977 million gallons (or 47,087 barrels) were reported as having been sent to municipal treatment plants. For the second half of 2011, that total was reduced to a mere 17,136 gallons or 408 barrels, a reduction of more than ten-thousand fold.

Of course we are still in the process of verifying both from the supply side and the demand side and we will continue to do so as we are seeing full cooperation all of the time. In that regard we sent a letter in July 2011 to approximately 88 drilling operators seeking their certification that they are no longer using any of the "grandfathered" facilities for wastewater from deep gas production. On the demand side, several NPDES permits are in-house for renewal and those renewed permits, if appropriate, will contain specific numerical limits for total dissolved solids.

Some Monday morning quarterbacks questioned DEP's method, saying that it should have "ordered" compliance back in April. But any orders would have likely resulted in protracted litigation. We obtained compliance in 28 hours instead of 28 months and the data is proving it.

In November 2011, DEP produced a White Paper on the potential use of Abandoned Mine Drainage water for fracking. This White Paper generated national attention and the Pennsylvania Legislature is in the process now of moving a bill which would aid the process of moving that initiative forward.

In March 2012, DEP published a revised general permit for the processing and beneficial reuse of liquid waste from oil and gas operations. This is part of our constant emphasis on recycling of flowback water. The general permit, GP-123, encourages using closed-loop processes which reuse liquid waste after it has been treated or processed. The General Permit also establishes water quality criteria that, if met, allow processed water to be managed, stored and transported as freshwater if it will be reused to fracture additional wells. There are currently ten facilities operating under this general permit and ten more have applied. Clearly, the industry is embracing recycling.

The Pennsylvania Marcellus Shale Advisory Commission Report

Pennsylvania Governor Corbett early on in his Administration created the Marcellus Shale Advisory Commission. I was honored to be a member of the Governor's Marcellus Shale Advisory Commission and co-chair of its Public Health, Safety & Environmental

Protection Subcommittee. The commission assembled experts from within the environmental, conservation, state and local government, academic and natural gas industry communities and its charge was to identify, prioritize and craft a set of comprehensive strategic recommendations regarding the safe, efficient and environmentally responsible extraction and use of unconventional gas reserves in Pennsylvania.

I can testify personally that the process itself was remarkable. The commission's approach was grounded in sound science, data and facts, not fiction, emotion or profits. I witnessed an amazing consensus building exercise among representatives of different backgrounds, outlooks and opinions. The commission was transparent in its business. There were 5 full commission public meetings and 16 work group public meetings. There were 60 expert presentations and 100 citizen presentations. There were hundreds of communications to the commission from the public.

The final report of the commission is 137 pages long and contains 96 recommendations. About one-half of those recommendations were in the area of public health and safety. Those recommendations are implementable through three separate avenues: statute, DEP regulation, or DEP Policy/Guidance. Many of the commission's recommendations are already being implemented.

Passage of Act 13 of 2012

Much of the vision of the Marcellus Shale Advisory Commission's recommendations ws enacted into law by Act 13 of 2012, which Governor Corbett signed on February 14, 2012. The provisions of Act 13, together with several other statutory provisions[2], include, but are not limited to the following:

World Class Standards For Unconventional Drilling and Development

- Increase well bonding from $2,500 up to $10,000
- Increase blanket bonds from $25,000 up to $600,000
- Increase well setback distance from streams, rivers, ponds and other water bodies 100 feet from the edge of the pad and 300 feet from the well head
- Increase well setback distance from private water wells from 200 feet to 500 feet and to 1,000 feet from public drinking water systems
- Expand a gas operator's "presumed liability" for impairing water quality from 1,000 feet to 2,500 feet from a gas well, and extend the duration of presumed liability from 6 months after well drilling to 12 months after well completion
- Enable DEP to take action against bad actors in a more efficient manner
- Requires DEP to inspect after installation of erosion and sedimentation controls
- Requires real-time notice to DEP of critical stages of drilling operations

[2] Act 127 of 2011 and Act 9 of 2012.

Enhancing and Protecting Our Natural Resources

- Incent the utilization of non-freshwater sources for well development
- Water Management Plans must be submitted with well permit applications
- Condition a well permit based on its impact on public resources like parks, wildlife areas, natural landmarks, special plant and species habitat and other resources
- Limit drilling activities within floodplains and prohibit where appropriate
- Utilize state of the art management practices for well site construction and operation

Protecting Public Health and Safety

- Triple penalties for civil violations from $25,000 to $75,000
- Increase daily penalties from $1,000/day to $5,000/day
- Authorize DEP, rather than the Environmental Hearing Board, to assess civil penalties
- Provide education to health care providers and the public on potential health impacts associated with drilling activities
- Significantly expand the chemical disclosure requirements and specifically require even trade secret information to be provided immediately to health care professionals for the treatment of patients
- Expand the Public Utility Commission oversight of pipeline safety standards and inspections[3]
- Authorizes DEP to enter into contracts with well control specialists
- The Pennsylvania Emergency Management Agency (PEMA), under Act 13 of 2012, will be doing the following:
    - Creating regional safety task forces
    - Establishing specialized team of emergency responders
    - Providing comprehensive training for local responders
- Assign 911 addresses and GPS coordinates to well sites and facilities[4]

Pennsylvania's Act 13 Chemical Disclosure Law

Much of the attention and discussion lately have been about the nature of chemical disclosure. Pennsylvania's disclosure law, which is contained within Act 13, is one of the most forward thinking and expansive disclosure laws in the nation. Our law was modeled after the Colorado disclosure law that was embraced by a broad spectrum of stakeholders including environmental groups such as the Environmental Defense Fund. Our law provides for disclosure through a publicly accessible web-based database known as FracFocus.org. The law provides for mandatory disclosure--even of proprietary information--to health care professionals for the purpose of diagnosis or treatment and immediately in an emergency. These health care professionals can share the information

[3] Act 127 of 2011.
[4] Act 9 of 2012.

with their patients, as well as other health care professionals as needed to care for the patient. Previously, there were no such disclosure requirements in Pennsylvania regarding health care professionals.

The notion that some have spread that the law provides a "gag order" on health care professionals because there is a confidentiality provision which accompanies disclosure is untrue. The confidentiality provision requires only the health care professionals' use the information for treatment of a patient. This issue is a red herring and my colleague Secretary of Health Dr. Eli Avila and the Pennsylvania Environmental Council (PEC) agree with me. Secretary Avila has written that "one of the strong benefits of Act 13's disclosure requirements is its proactive approach to ensuring that health care professionals have access to all information they may need to provide care for their patients." A copy of Secretary Avila's letter dated April 17, 2012 directed to Dr. Marilyn J. Heine of the Pennsylvania Medical Society is attached hereto as an Exhibit.

The Pennsylvania Environmental Council, one of our Commonwealth's longest standing and most respected environmental advocacy groups, has stated that Act 13's disclosure provisions "ensure that medical professionals can quickly get direct access to chemical information for which trade secret protections have been claimed in cases where it's needed for diagnosis or treatment of a patient. . . . [W]ithout such language, there's nothing to guarantee that a doctor will be able to compel companies to turn over trade secret information quickly or even at all." PEC also said that Act 13's provisions for confidentiality which call for the information to be used only for the purpose of medical care "replicates the same process that has been in place for the same purpose in other states and that has existed for decades in the federal Occupational Health and Safety Act (OSHA) and the federal Emergency Planning and Community Right to Know Act (EPCRA)."

Overview of Pennsylvania's Existing Regulatory Programs

Well Site Location

Act 13 outlines the governing law now with respect to well site location, including setbacks. The Dam Safety and Encroachments Act (32 P.S. §§ 693.1 *et. seq*) and the Clean Streams Law (35 P.S. §§ 691.1 *et seq*) also provide strictures where well sites may be located and how the site should be constructed.

25 Pa. Code Chapter 105 (the Dam Safety and Encroachment regulations) requires well operators to obtain an encroachment permit if a well site or other support facility (such as an access road or water withdrawal pad) is located within a FEMA designated floodway. If FEMA has not designated a floodway (as can be the case for small streams), the operator must obtain a permit if the facility will be within 50 feet of a stream. For Chapter 105 purposes, a stream is anything that has a defined bed and bank – this is much more inclusive than the Oil and Gas Act of 2012 provisions.

Site Development

Developing a well site outside the location restrictions of the Oil and Gas Act of 2012 and the Dam Safety and Encroachments Act is regulated under the Clean Streams Law through the Department's erosion and sediment control program.

Stormwater runoff is the leading cause of stream impairment in Pennsylvania. To address this problem, DEP has developed a comprehensive stormwater management program. Pursuant to 25 Pa. Code Chapter 102, all earth disturbance activities must employ "best management practices" like silt fences and road side culverts to control erosion and manage stormwater. Relative to building sites in floodplains, pits and impoundments used to store waste material may not be used if the bottom of the pit will be within 20 inches of the ground water table. 25 Pa. Code § 78.56. In floodplains, the ground water table will be close to the surface and therefore, drilling wastes would need to be contained in tanks if a pit could not be used.

If well site construction will disturb more than 5,000 square feet or has the potential to discharge sediment to High Quality or Exceptional Value waters (so classified pursuant to 25 Pa. Code Chapter 93), the operator must develop and implement an erosion and sediment control plan. This E&S plan must be kept on site for review by DEP. If development of the well site, access roads and other related facilities will disturb 5 or more acres, the operator must obtain an erosion and sediment control permit before the site can be developed.

Well Drilling

Drilling any well – even a water well – has the potential to impact fresh groundwater. While this potential may exist, such an impact is not acceptable. Protecting groundwater supplies is of utmost importance and the Oil and Gas Act of 2012, as amended by Act 13, is particularly strict in this regard. If a well operator impacts a water supply (by pollution or diminution), they *must* restore or replace it and pay for any increased costs of maintaining or operating the replacement supply.

As noted before, Act 13 increases the rebuttable presumption area and time. Act 13 provides that the gas operator's "presumed liability" for impairing water quality extends to 2,500 feet from a gas well and the duration of presumed liability is 12 months.

In fact, if an oil or gas well is drilled within 2,500 feet of a water supply and the water supply becomes polluted within 12 months of drilling, the operator is *presumed* to have caused the pollution unless they 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 2,500 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, in 2010, DEP promulgated new regulations that significantly strengthen our well construction

standards. These are our Chapter 78 regulations. These new regulations accomplish five things.

First, the regulations will establish more stringent well construction standards for all new wells drilled in Pennsylvania. Second, the regulations impose new requirements on operators to inspect existing wells and report their findings to the Department. Third, the regulations codify existing case law on water supply replacement requirements and clearly describe an operator's responsibilities if they contaminate or diminish a water supply. Fourth, the regulations impose a duty on operators to investigate complaints of gas migration and to mitigate any hazards found in the course of the investigation. Finally, the regulations require reporting of chemicals used to hydraulically fracture wells.

Of course the Chapter 78 chemical disclosure regulations have been substantially enlarged by Act 13 that includes one of the most aggressive chemical disclosure laws in the nation.

Following is a brief description of the significant new requirements in 25 Pa. Code Chapter 78.

I. New Well Drilling

Properly cementing and casing a well is critical to preventing gas migration. Prior to drilling a well, operators will now be required to develop a casing and cementing plan that shows how the well will be drilled and completed. Use of centralizers (which keep the casing centered in the well bore) must be used at prescribed locations to insure that cement is evenly distributed between the casing and the well bore. Cement meeting ASTM criteria for oil and gas wells must be used. Documentation of the cement quality and cementing practices used at the well must be available for Department inspection.

When cementing a well, if cement is not returned to the surface, the operator must install a second string of casing for an added layer of protection. If cement is returned to the surface and the operator intends to only use surface casing (Marcellus operators typically use surface, intermediate and production casing), the operator must demonstrate that any gas, oil and produced fluids cannot leave the well bore.

Used or welded casing must be pressure tested. Casing strings attached to heavy duty blow-out preventers (such as Marcellus intermediate casing) must also be pressure tested.

II. Existing Wells

Operators must inspect all of their wells quarterly and report the findings of the inspections to the Department annually. If defective casing, evidence of leaks, or if excessive pressure within the well bore is discovered, the operator must immediately notify the Department and take corrective action.

III. Water Supply Replacement

A well operator who affects a public or private water supply by pollution or diminution must restore or replace the affected water supply with an alternate source of water adequate in quality and quantity for the purposes served by the supply. This replaced or restored water supply must meet the water quality standards established by the Pennsylvania Safe Drinking Water Act or the preexisting water quality if the water supply exceeded the Act's water quality standards.

Act 13 increased the presumption of liability for water supply contamination for unconventional wells. Unless rebutted, the Act presumes that an operator is responsible for pollution of a water supply if the affected water supply is 2,500 feet from an unconventional well and that pollution occurred within 12 months of the later of completion, drilling, stimulation or alteration of the unconventional well.

Operators found to have impacted water supplies within the time and distance provisions of the presumption of liability must provide temporary potable water until the supplies are restored or replaced.

IV. Gas Migration Response

The new regulations impose a duty on operators to immediately investigate a gas migration complaint and to notify the Department if they receive such a complaint. If natural gas is found at elevated levels (10% of the lower explosive limit) the operator must immediately notify emergency responders and initiate mitigation measures (including advisories and controlling access to the area).

V. Reporting Requirements

I have already discussed Act 13's bold new chemical disclosure requirements. DEP's existing regulations require operators to disclose the chemical additives and the hazardous constituents of those additives on a well by well basis. While DEP has never observed any evidence that hydraulic fracturing has directly contaminated fresh groundwater despite tens of thousands of wells being "fracked" over the past several decades, mandating public disclosure of the chemicals used in the process should end much of the controversy surrounding the subject.

Water Withdrawal

While the volume of water to hydraulically fracture a Marcellus well is greater than the amount required to stimulate traditional wells in Pennsylvania, the Marcellus industry's use of water is miniscule in comparison with other energy sources and other sources in general. Marcellus fracking is the smallest major user in Pennsylvania using only 0.2% of the daily water withdrawn which ranks it ninth of the top nine water users in the state. Marcellus drilling uses approximately 1.9 million gallons per day (MGD). This is in stark contrast to power plants which use 6.43 *billion* gallons per day (BGD). Other major

uses include public water suppliers (1.42 BGD); industrial users (770 MGD); aquaculture (524 MGD); private water wells (152 MGD); mining (95.7 MGD); livestock (61.8 MGD); and irrigation (24.3 MGD). Thus, shale gas drilling is a very efficient energy production source measured as a function of water usage.

I have attached a graphic, which was prepared by the PA Fish and Boat Commission, that dramatically illustrates this.

There are three entities charged with protecting water quality by managing water withdrawals in Pennsylvania: the DEP, the Susquehanna River Basin Commission (SRBC) and the Delaware River Basin Commission (DRBC).

Indeed, let me digress for a moment to demonstrate how even a multi-state effort to try to regulate hydraulic fracturing has been ineffectual. I think the following story about an interstate compact illustrates why the individual states are far superior and more capable of regulating natural gas exploration within their own borders than an multi-state entity.

DRBC has five members: New York, New Jersey, Pennsylvania, Delaware and the Army Corps of Engineers. By fiat, the DRBC has declared a "moratorium" on hydraulic fracturing while it purports to develop its own regulations covering that practice within the entire basin. Ignoring for the moment the questionable ground upon which a water withdrawal regulator can attempt to regulate land use and the practice of natural gas exploration, that "moratorium" covers several counties in Pennsylvania in which landowners want to proceed with extraction of their mineral property and where we have an effective regulatory program in place.

The "moratorium" also stands in place even though hydraulic fracturing has been done safely in the United States and in Pennsylvania for over 60 years. There are over 1.2 million fracked wells. The Pennsylvania DEP under my predecessor and me has shown that fracking can be done safely here. The sitting EPA Administrator and Secretaries of Interior and Energy have all said that fracking has been done, is being done and can continue to be done safely. None of them has called for a moratorium or endorsed that idea. All of that led a major New York City paper's editorial board to call for New York to "join the 21st century" and proceed with natural gas extraction in that state. And, as I mentioned earlier, just the other day the State University of New York (SUNY) at Buffalo released a report which found that Pennsylvania regulations have been quite effective at reducing the impacts per well drilled and that there is a compelling case that Pennsylvania state oversight of oil and gas regulation has been effective. And Pennsylvania Governor Corbett's initiative with the new Act 13 has added even more protections such as increased setbacks, bonding, disclosure and environmental enforcement tools. The SUNY Buffalo report further concludes that New York's proposed regulations are sufficient and protective.

The Susquehanna River Basin Commission imposed no moratorium there, nor did the Ohio River Sanitation Commission (ORSANCO) in the Ohio River basin. DRBC staff has indeed undertaken a very deliberative approach having taken several years to develop

draft regulations that were subject to many rounds of public comment. DRBC staff, who developed the regulations, felt they were protective. After the deliberative process, DRBC put those draft regulations on the agenda for a vote by the Commission on Monday November 21, 2011. On the eve of the meeting Delaware dispatched a letter dated November 17, positing supposed objections and there has been paralysis ever since. Mineral rights owners in Pennsylvania are frustrated and upset saying that their property is being taken with no factual or scientific justification and that one state has put a veto on the legitimate energy producing activities of a neighbor. So frustrated and upset that they have hired legal counsel and a takings lawsuit against DRBC is a real possibility.

As I have mentioned, oil and gas exploration and extraction have already provided huge economic benefits to Pennsylvania and the promise for the future is immense. This is so right in the heart of the Delaware Valley. The Philadelphia Inquirer reported on the huge savings already being realized in the Delaware Valley from reduced gas and electricity bills. The employment/supply chain already includes significant inputs from the Delaware Valley; just ask companies like West Chester based, employee owned Schramm and Berwyn based ModSpace. We have also seen that Pennsylvania's and our nation's oil and natural gas resources may hold the key to reinvigorating one or more of our southeastern Pennsylvania refineries and/or the petrochemical industry here. Energy Transfer Partners' recent acquisition of Sunoco – coupled with a strong statement on its commitment to Marcellus Shale-related activity – is another tangible example of this opportunity benefiting southeastern Pennsylvania.

We do want to engage with Delaware and all the partners of the DRBC to have the regulations approved by DRBC. In fact we have come a very long way since the letter of November 17 on the topics it raised. I have reached out to my counterpart in Delaware, Department of Natural Resources and Environmental Control (DNREC) Secretary Collin O'Mara, to offer to come visit him and his experts with my experts and to have all of us visit some natural gas development sites so that we can focus on showing how the points and questions raised in the letter of November 17, 2011 are addressed so that we can move forward.

DEP is on the forefront of protecting headwaters of the Commonwealth's streams in areas outside the Basin Commission jurisdiction by requiring operators to adhere to water management plans which governs their water withdrawal practices.

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. Evaluation of the plan involves looking both upstream and downstream to assess cumulative impacts, taking into account all other withdrawals and discharges and their impact on the resource, particularly during low flow periods.

Generally speaking, if the water withdrawal is less than 10 percent of the natural or continuously augmented 7-day, 10-year low flow (Q7-10) of the stream or river, a passby (a restriction on the ability to take water during low flow conditions) will not be required. Q7-10 is the lowest average, consecutive 7-day flow that would occur with a frequency

or recurrence interval of one in ten years. A 10-year low flow event has a 10 percent chance of occurring in any one year. Accepted hydrologic practices must be used to determine the Q7-10 flow.[5]

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 fracture a well, the question becomes where to put it? Even more important is figuring out where to put the wastewater that returns to the surface. 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 freshwater, and more increasingly, flowback from a hydraulic fracturing 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 over 15 million gallons and if they store wastewater, must be permitted and constructed according to DEP standards. Key standards include two impervious 40 mil liners with a leak detection zone and groundwater monitoring wells 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. Operators report that approximately 15% of the water used to stimulate a well is returned to the surface during the initial flowback period. The Department has seen an increase in reuse of this wastewater – industry-wide approximately 80% of the flowback is used on another hydraulic fracturing job. Thus, the total volume of wastewater that must be disposed is a small fraction of the volume needed to stimulate the well.

Still, flowback from Marcellus hydraulic fracturing jobs contain pollutants of concern – particularly high levels of dissolved salts. Indeed, flowback water is several times saltier than sea water. Thus, Total Dissolved Solids (TDS) represent a growing concern for the Commonwealth's waterways and the Department has developed a proactive strategy to address this concern before widespread impacts are felt.

---

[5] Policy No. 2003-01 Guidelines For Using and Determining Passby Flows and Conservation Releases For Surface-Water and Ground-Water Withdrawal Approvals, November 8, 2002.

The best solution for disposing of high TDS wastewater is deep well injection. Unfortunately, the best geology in Pennsylvania for this method of waste disposal is being used for gas storage. Exploration for new injection sites is ongoing but not commercially available yet.

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 and instead rely on dilution. The DEP's recently promulgated Chapter 95 regulations completely address the cumulative impacts of oil and gas wastewater discharges.

This new rule is the first of its kind in the country and limits the discharge of TDS from new or expanded facilities that take oil and gas wastewater to drinking water standards. This means that new discharges cannot exceed 250 mg/l for chlorides and that drinking water supplies will never be impaired because of oil and gas drilling. The process of eliminating the TDS will also remove radium – which has been the subject of recent articles. Thus, in addition to reducing the contaminants discharged to our streams, the new Chapter 95 rule will increase the use or recycled water, promote the development of alternative forms of disposal and perhaps promote the use of alternative sources of fracking fluid.

Drinking Water Protection

I outlined in my April 6, 2011 letter to EPA Region III Administrator Garvin, which is attached as an exhibit, that over the past three years the Commonwealth has been very pro-active in protecting potential sources of drinking water. The April 6, 2011 letter is attached as an Exhibit. In addition to the Chapter 95 TDS regulations discussed above, there are other measures being implemented. DEP recently announced the results of our in-stream water quality monitoring for radioactive material in seven of the Commonwealth's rivers. All samples showed levels at or below the normal naturally occurring background levels of gross alpha and gross beta radiation. Those tests were conducted in November and December of 2010 at stations downstream of wastewater treatment plants that accept flowback and production water from Marcellus Shale drilling. These sampling stations were installed last fall specifically for the purpose of monitoring stream quality for potential impacts from unconventional gas drilling operations. The raw water river samples were collected above public water suppliers' intakes where the water receives further treatment.

The seven river testing stations are located at the Monongahela at Charleroi in Washington County; South Fork Ten Mile Creek in Greene County; Conemaugh in Indiana County; Allegheny at Kennerdell in Venango County; Beaver in Beaver County; Tioga in Tioga County; and the West Branch of the Susquehanna in Lycoming County. These stations were chosen because of their proximity to public water supply intakes and at the time, were located downstream of facilities permitted to or proposing to discharge oil and gas wastewater. Future monitoring will include monthly sampling at the Monongahela; South Fork Ten Mile; Allegheny; and Beaver sites and every other month

at the remaining three sites. Moreover, gross alpha and gross beta testing was added to a second water quality network station on the Monongahela, in March 2011. This site is further downstream in Allegheny County. All of the results will be frequently evaluated and available to the public via EPA's Modernized STORET database.

There is more. Pennsylvania DEP has taken measures to have additional monitoring of finished water at 14 public water supplies with surface water intakes downstream from wastewater treatment facilities that accept Marcellus wastewater. On March 11, 2011, under Pennsylvania regulation 25 Pa. Code §109.302, we directed a letter to public water suppliers that have surface water intakes located downstream of one or more facilities that are accepting Marcellus wastewater to immediately conduct testing of radionuclides (i.e., radioactivity) and other parameters including TDS, pH, alkalinity, chloride, sulfate and bromide. A copy of that letter and the list of recipients is attached hereto as an Exhibit.

In addition, Pennsylvania DEP, on March 18, 2011, under Pennsylvania regulation 25 Pa. Code §92a.61(g), sent letters to 25 Publicly Owned Treatment Works and Centralized Waste Treatment facilities that currently accept this wastewater calling for immediate twice monthly effluent monitoring for radionuclides and other parameters including TDS, pH, alkalinity, chloride, sulfate, bromide, gross alpha, radium 226 & 228, and uranium.

I have already discussed earlier the DEP's April 19, 2011 call to all Marcellus Shale natural gas drilling operators to cease by May 19 delivering wastewater from shale gas extraction to 15 facilities that then accepted it under an exemption from being covered by the 2010 Total Dissolved Solids (TDS) regulations and the dramatic response to that initiative. Also, I have already discussed the Abandoned Mine Drainage White Paper and our new General Permit 123.

Air Quality Impacts

Of course, it has been recognized that combustion of natural gas as either a fuel for generating electricity or a transportation fuel can have very beneficial impacts on air quality. With that being said, Pennsylvania is proactive in minimizing any potential adverse air impacts from extracting this resource.

Through the leadership of state-implemented air programs like Pennsylvania's, the air in the United States and in Pennsylvania has steadily become cleaner over the past few decades which is borne out by EPA air trend data and DEP air monitoring data. In February 2010, the EPA released the report Our Nation's Air, Status and Trends through 2008. EPA's report notes that improving nationwide air quality trends have been observed. Significant reductions were seen for six common air pollutants, including: ground-level ozone, particulates, lead, nitrogen dioxide (NO2), carbon monoxide (CO) and sulfur dioxide (SO2). Toxic air pollutants have seen a 40% total reduction from 1990 to 2005. EPA states that the NOx SIP Call and the Acid Rain Program have contributed to significant decreases in atmospheric deposition improving visibility and water quality of lakes and streams.

Pennsylvania has a very comprehensive and robust set of air quality regulations and we have administered that program with great success for over 25 years. Actual extraction operations are subject to a host of existing permitting requirements. Those permit requirements, whether a general permit or an individual permit, require the use of technologies which control air emissions.

DEP took the proactive step of launching a short-term ambient air quality sampling initiative in the southwest, northeast and north-central regions of Pennsylvania in April 2010. This initiative focused on natural gas extraction stages including drilling operations, fracking operations where wastewater was being produced, the flaring of gas for production and gas compression facilities.

Although concentrations of certain natural gas constituents were detected, DEP did not identify concentrations of any compound that would likely trigger air-related health issues associated with Marcellus Shale drilling activities. DEP also tested for carbon monoxide, nitrogen dioxide, sulfur dioxide and ozone, but did not detect concentrations above National Ambient Air Quality Standards at any of the sampling sites. DEP is currently developing a protocol for a long-term sampling effort. Additionally, DEP has the authority to develop a comprehensive emissions inventory. Such data will allow the Department to develop an accurate inventory to support air quality planning activities including state implementation plans to achieve and maintain the health-based federal standards such as ozone, fine particulate matter and the recently promulgated short term nitrogen dioxide and sulfur dioxide standards.

DEP is now implementing several studies of what, if any, longer term air impacts there might be from oil and natural gas exploration and extraction activities.

Enforcement

I have already outlined how Act 13 increased penalties for violators and given DEP new tools for enforcement. Pennsylvania DEP has been very strong on enforcement of rules and regulations in this industry. DEP has shown its agility and decisiveness on the enforcement front in issuing two cease and desist orders as a team within hours when it was appropriate to do so. In one case we issued a "cease drilling order" for non-Marcellus well drilling and in the other case we ordered a stop to pre-drilling well pad preparatory activities which were resulting in sediment being released into a nearby stream upstream of one of the various water intakes of a local water authority. In the latter case we received a letter of thanks from the local water authority for DEP's "immediate" and "prompt response" in doing so. The water authority went on to write "[t]his situation has reinforced our belief that the interest and importance of our water source is of utmost importance to all and that Pennsylvania Department of Environmental Protection works hard to sustain this valuable resource".

In response to the April 20, 2011 well equipment failure and resultant loss of control of a well in Leroy Township, Bradford County, DEP issued a notice of violation (NOV) just two days later dated April 22, 2011 in which it required the operator to answer many

questions about the incident itself and its root cause and insisting that the company remain on stand-down from well development activities until it could provide DEP technical personnel sufficient assurances that there would be no repeat of the event there or elsewhere. DEP also asked the following important question: why it took nearly 12 hours to address the uncontrolled release of fluids from the well. After three weeks in which the company was in stand-down mode, our technical staff did report to me that they had been provided adequate assurances and the company then did restart well development operations. However, we have more. We now have a commitment by the operator that it will from now on engage and use local well control professionals in the very unlikely event that a future well control incident at one of its wells would occur in Pennsylvania. DEP had not asked for that particular measure in its April 22, 2011 NOV but we insisted on this during subsequent discussions and we achieved it.

DEP announced in 2011 more than $1 million in penalties against an operator to address violations in Bradford and Washington Counties. Through two Consent Orders and Agreement (COA) with Chesapeake, DEP collected $900,000 for contaminating private water supplies in Bradford County, $200,000 of which must be donated to the department's well plugging fund; and another $188,000 for the February 23, 2011 tank fire at a drilling site in Avella, Washington County. The Bradford County matter was the highest single penalty ever assessed against any oil and gas operator in the history of the program. In the Washington County matter, the fines assessed were the highest allowed by the Oil and Gas Act.

The United States Department of Energy (DOE) Shale Gas Production Subcommittee August 2011 Ninety-Day Report

Before I close I would like to take a minute to discuss the DOE Subcommittee Report on Shale Gas Production. In August 2011 the Shale Gas Subcommittee of the United States Secretary of Energy Advisory Board issued its "Ninety-Day Report." The board was charged "with identifying measures that can be taken to reduce the environmental impact and improve the safety of shale gas production." It is no coincidence that the sitting Pennsylvania DEP Secretary and my immediate past two predecessors were asked to participate in that process. The report contains many conclusions and observations that show Pennsylvania is out in front.

The DOE report recognizes the significant contribution domestic natural gas is and will play in the future in domestic energy supply. It recognizes that real jobs have been created in the sector.

The DOE report touts the adoption of best practices for well construction, especially casing and cementing. Pennsylvania's Chapter 78 regulations cover that topic and the industry and the department have been in ongoing discussions on that topic for some time.

The DOE report recognizes what I discussed at the beginning of this testimony, *i.e.*, the gap between real science and experience and perception regarding drilling and production

of domestic natural gas. In that regard the DOE report acknowledges the small or minimal risk that fracking itself poses to groundwater. At the same time it notes the need to protect groundwater resources. I have discussed the lengths that Pennsylvania is already going in that regard.

The DOE Report recognizes the need to maintain collaborative relationships among industry, regulators and the public. The Report suggests there be collaboration among industry and government and the public to educate and gather real data regarding experience as we move forward. This is an effort that we have been undertaking in Pennsylvania for a long time.

The DOE Report, as did our Shale Advisory Commission, notes that local impacts should be considered and accounted for.

The DOE Report pointed out the useful role that STRONGER plays. Pennsylvania's Deputy Secretary for Oil and Gas is now on the Board of Directors of STRONGER.

The DOE Report also notes as an important issue the potential air related issues associated with this resource and recommends that data be developed to get a handle on that topic and that it be dealt with so as to avoid negative air pollution impacts from the extraction of this resource. I have already discussed Pennsylvania's multi-faceted approach in that area.

Conclusion

Thank you for the opportunity to provide testimony here today. Pennsylvania's program is multi-faceted, transparent and very protective. As you can see, the states are the right regulators of hydraulic fracturing, not the federal government. The law, the history and the facts bear that out.

Until he was nominated by Governor Tom Corbett to be Pennsylvania's Secretary of the Department of Environmental Protection (DEP), Mike Krancer was a Judge on the Pennsylvania Environmental Hearing Board (EHB). The EHB is the state-wide trial/appellate court for environmental cases which tries appeals from actions of the DEP. He was first nominated to serve as a Judge on the EHB by Pennsylvania Governor Tom Ridge in October 1999. The Senate of Pennsylvania confirmed the nomination and Mr. Krancer took the oath of office in November 1999. In February 2003, Judge Krancer was named by Pennsylvania Governor Edward G. Rendell as Chief Judge and Chairman. Before becoming a Judge, Mr. Krancer was a litigation partner at the Dilworth and Blank Rome law firms in Philadelphia. His practice involved complex commercial, white collar criminal and environmental litigation. Judge Krancer stepped down from the EHB in April 2007 to devote full time to his candidacy for Justice of the Pennsylvania Supreme Court. Secretary Krancer became an Assistant General Counsel for the Exelon Corporation in June 2008. While with Exelon he provided legal counsel in the areas of environmental, health and safety compliance and litigation. He also worked on energy policy matters and with the company's government relations team. He was asked by Governor Rendell to return to the EHB as a Judge in 2009.

Secretary Krancer serves on the Board of Directors of Inn Dwelling, a non-profit faith-based initiative corporation associated with St. Vincent de Paul Roman Catholic Church located in the Germantown section of Philadelphia, whose mission is capacity-building among disadvantaged families in the Germantown and Northeast sections of Philadelphia. Judge Krancer worked with Inn Dwelling high school students as a volunteer writing skills coach. Judge Krancer also currently serves on the Board of Trustees of Neumann University, a private, Catholic, co-educational University in the Franciscan tradition, located in Aston, Delaware County and was formerly on the Board of the Riverbend Environmental Education Center in Gladwyne. He also served as Vice President of Riverbend.

Secretary Krancer is an active member of the Montgomery Bar Association (MBA) and he has been elected to serve on the Board of Directors and the Executive Committee of the MBA commencing in 2005. He is a former Chairman of the Environmental Law Committee and is an active member of the Municipal Law and Government Relations Committees. He also served on the MBA Judiciary Committee and is a mentor in the MBA mentoring program. He is a frequent faculty lecturer for various Continuing Legal Education programs on various topics including the Pennsylvania Judges' and Attorneys' Code of Civility and lobbying law and practice.

Secretary Krancer is an avid student of Hebrew and Christian Biblical Canon and he has pursued undergraduate and graduate level coursework in theology and biblical studies and exegesis at Villanova University. He is also a student of naval history, especially naval aviation from its dawning through its heyday, the World War II Pacific Campaign. He is a member of the United States Naval Institute and the Navy League of the United States. He is also a Civil War Re-enactor. He is proud to be a Private of the 20th Maine Volunteers, Company E (Army of the Potomac, Fifth Corps, First Division, Vincent's Brigade). He has seen "action" at Gettysburg, Stanardsville and Cedar Creek among other engagements.