

# Citizens' Guide to Marcellus Shale in Pennsylvania

*Prepared by the National Sea Grant Law Center  
& Pennsylvania Sea Grant*

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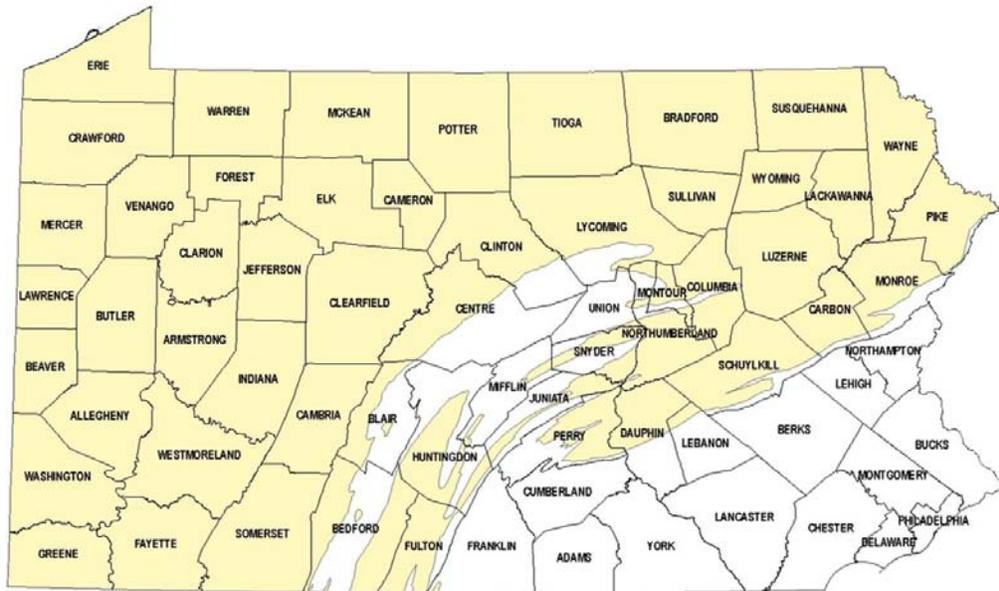
*Cover photograph of Marcellus Shale drilling tower on Pennsylvania Route 118 courtesy of Wikimedia Commons, photographer Ruhrfisch.*

## I. Introduction

Demand for natural gas--cited as a cheap and clean source of fuel--is high. In fact, the U.S. consumes 20 trillion cubic feet each year.<sup>1</sup> Along with high demand, the desire to reduce U.S. dependence on foreign oil makes Marcellus Shale, a natural gas source located under parts of Pennsylvania, New York, West Virginia, Maryland, and Ohio, an attractive option.

### The Marcellus Shale Region of Pennsylvania

Data are from  
U.S.G.S., 2002.



Marcellus Shale is estimated to hold trillions of cubic feet of natural gas, and with current usage rates, the shale may contain over a 100-year supply of natural gas for the US. Despite the potential resources available, gas extraction associated with deep American shale deposits was prohibitively expensive until recent advances in drilling technology revived interest in production.<sup>2</sup>

According to Pennsylvania Department of Environmental Protection (DEP):

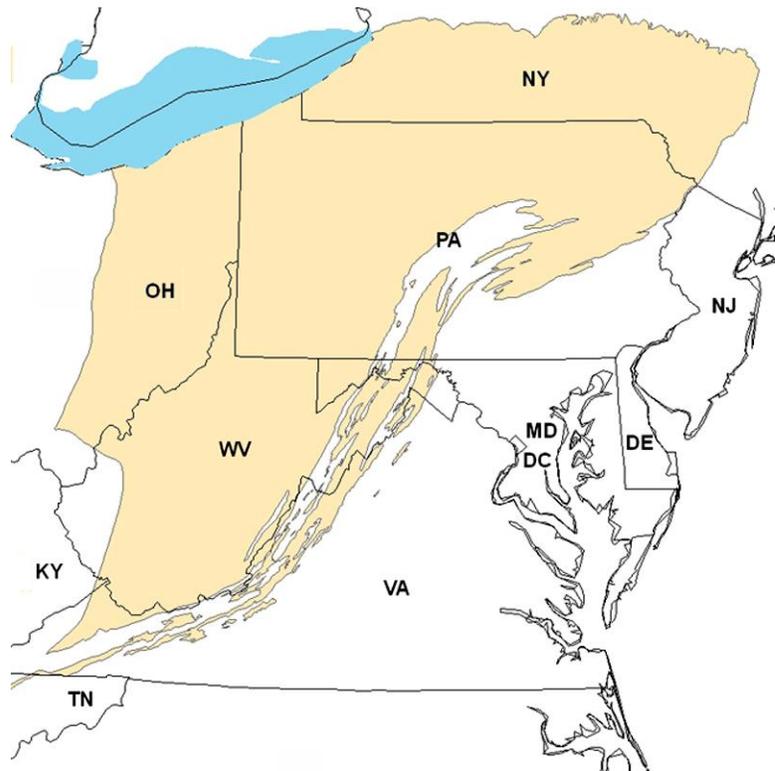
*Extracting natural gas from the Marcellus Shale formation requires both vertical and horizontal drilling, combined with a process known as 'hydraulic fracturing' After the well is drilled, cased and cemented to protect groundwater and the escape of natural gas and other fluids, drillers pump large amounts of water mixed with sand and other fluids into the shale formation under high pressure to fracture the shale around the well, which allows the natural gas to flow freely to the well bore. The amount of water typically required for hydraulic fracturing ranges from about one million gallons for a vertical well to approximately five million gallons for a vertical well with a horizontal lateral. Once the hydraulic fracturing process is completed, the used water, often referred to as "frac returns" must be reused in the next well or sent to an approved treatment facility.<sup>3</sup>*

As production in the area has ramped up, landowners and area residents have expressed substantial concerns over the drilling, extraction, and transport of the natural gas. For example, the extraction process uses millions of gallons of water. The withdrawal of this water from area streams and waterways can have a significant effect on wildlife. Residents are also concerned with the effects of the drilling on surface water and groundwater, which supplies drinking water for thousands of wells across Pennsylvania. Other impacts include noise pollution, forest fragmentation, and the spread of invasive species.

This citizens' guide is geared to landowners who might lease land, as well as residents who are not leasing land but are seeking information on the process and how they might get involved. The guide will provide a brief overview of potential impacts, the regulatory process in Pennsylvania, how residents may participate in the process, and where to go for more information.

### Marcellus Shale Formation

*The Marcellus Shale region of the Mid-Atlantic is believed to contain the third largest natural gas reserve in the world. A very small finger of the formation extends under Lake Erie into Canada (not shown). Data are from U.S.G.S., 2002.*



## II. Leasing & Regulatory Process

### A. Leasing Process

In Pennsylvania, the owners of the surface rights may or may not own mineral rights. To access natural gas in Marcellus Shale, drilling companies must lease the land from landowners who own the mineral tract.<sup>4</sup> Through a mineral lease, the owner of a mineral tract (the lessor) will grant the right to develop deposits of the mineral to a producer (the lessee).<sup>5</sup> A lease will usually specify annual rental payments and any royalty on production paid to the lessor.<sup>6</sup> The terms of the lease are negotiable, including lease payments and royalty amounts; well, road and pipeline locations; protections for crops, livestock, buildings and personal property; and expiration date of the lease.

One law pending in the Pennsylvania legislature addresses mineral interests that have not been utilized, transferred, sold, leased or mortgaged for a period of ten years (House Bill 1436).<sup>7</sup> The law would allow the surface owner to submit a claim to have the property declared abandoned. Another proposed law, the “Conservation Pooling Act” would “achieve multiple compelling policy goals, including: minimizing the surface impact of Marcellus Shale drilling by limiting the number of well pads (usually 5 acres) necessary to develop a drilling unit (usually 640 acres); maximizing the opportunity for landowner/lessors (i.e., royalty owners) to obtain full economic benefit from their Marcellus leases; protecting non-mineral interest owners from having natural gas developed from under their property under the Rule of Capture without fair compensation; ensuring no surface trespass for non-mineral interest owners who are pooled into a unit.”<sup>8</sup>

Landowners are advised to consult an attorney who is familiar with oil and gas law before entering into a lease agreement.<sup>9</sup> An attorney can review a landowner’s legal rights, explain the potential benefits and consequences of leasing, evaluate offers, and, if the landowner decides to lease his or her land, help negotiate a deal. Several Pennsylvania county bar associations offer a local lawyer referral service (For a list of county bar contacts, see [www.pabar.org/public/membership/lrsblurb.asp](http://www.pabar.org/public/membership/lrsblurb.asp) ). For all other counties, the Pennsylvania Bar has a lawyer referral service which can be reached by calling (800) 692-7375 or (717) 238-6807.

For more detailed information on the leasing process, please visit:  
[www.elibrary.dep.state.pa.us/dsweb/Get/Document-44185/5500-FS-DEP2834.pdf](http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-44185/5500-FS-DEP2834.pdf)

### B. Regulatory Process

After the company obtains rights to extract the gas, it must obtain permits from appropriate agencies before beginning work. Who is in charge of issuing those permits and regulating operations? Federal, state, and local authorities all have roles in regulating Marcellus Shale drilling. At the state level, the Pennsylvania Department of Environmental Protection (DEP) is the lead regulatory agency for most aspects of natural gas extraction. The DEP’s Bureau of Oil and Gas Management is responsible for reviewing and issuing drilling permits for the gas drilling, inspecting drilling operations, and responding to complaints about water quality

problems.<sup>10</sup> Oil and gas companies are required to obtain several permits and approvals before they begin the extraction process.

### ***Primary Permits and Approvals***

#### **Well Drilling Permit and Bond**

Before beginning drilling activities, a company must submit a well drilling permit application to DEP and post a bond.<sup>11</sup> A single well bond is \$2,500 and a blanket bond for any number of wells is \$25,000.<sup>12</sup> As part of the permit application, the owner or operator must include a Water Management Plan and an Erosion Control Plan. Additionally, the well may not be drilled within 100 feet of springs, streams, bodies of water, or wetlands without a variance.<sup>13</sup>

Upon filing a permit, a company is required to notify landowners whose land is on or abuts land on a pipeline route and landowners whose water supplies are within 1,000 feet of the proposed well location.<sup>14</sup> Surface landowners and landowners whose water supplies are within 1,000 feet of the well have 15 days to file objections.<sup>15</sup>

#### **Water Management Plan**

Owners or operators are required to submit a Water Management Plan with their well drilling application. The plan must contain information on planned use and withdrawal of source water and monitoring plans, as well as any approvals from the Susquehanna River Basin Commission or the Delaware River Basin Commission. The plan should also contain stream impact and flow analysis.

#### **Erosion and Sediment and Storm Water Control Plan or Permit**

Companies must prepare erosion and sediment control plans to include with the well drilling permit. The plans must comply with soil conservation best management practices established by DEP. For earth disturbances involving oil and gas activities that involve 5 acres or more, a DEP Erosion and Sediment Control Permit (ESCGP-1) is required.<sup>16</sup>

#### **NPDES Permit**

A general or individual National Pollutant Discharge Elimination System (NPDES) Permit is required for discharges of pollutants from point sources into surface waters. Regulated discharges include stormwater from construction and industrial activities.

The permit system is authorized by § 402 of the federal Clean Water Act. The Environmental Protection Agency (EPA) has delegated permitting authority to the DEP. Most construction activities may use a general NPDES permit; however, activities in special protection watersheds require an individual NPDES permit. In most instances, the permit is issued by the DEP and permit processing is handled by county conservation districts. Operators are required to publish a notice of intent to apply for a permit in a newspaper of general circulation for four consecutive weeks. A public comment period of 30 days allows residents to submit comments or raise concerns, as well as request or petition for a public hearing.

### Water Quality Management Permit

Owners or operators whose activities will result in the discharge of wastewater via land application or who plan to construct or operate wastewater treatment facilities or construct, operate, and maintain an impoundment to store wastewater must obtain a Water Quality Management Permit from DEP. Injection of oil and gas wastewater into a disposal or enhanced recovery well requires a well permit or registration from DEP and Underground Injection Control (UIC)<sup>17</sup> approval from Region 3 office of the EPA, not a state water quality permit.

### Preparedness, Prevention, and Contingency Plan

Plans must be submitted with either a NPDES application or Water Quality Management Permit application for activities which have the potential for accidental release of pollution materials to surface water or groundwater.

### ***Additional Permits and Approvals***

#### Solid Waste Permits and Approvals

Approvals from DEP are required for transporting or disposing of waste from well sites.

#### Water Withdrawal Permit

In most parts of the state, the Susquehanna River Basin Commission and the Delaware River Basin Commission review and approve water withdrawals necessary for the drilling operations. In Western Pennsylvania, there are no basin compacts so common law regulates water withdrawal issues. Additionally, gas companies must submit a water management plan (above) with their well drilling permit.

#### Dam Safety and Encroachments Permit

Before any oil and gas company can construct, operate, maintain, modify, enlarge or abandon any dam, water obstruction, or encroachment, which could include access roads, stream crossings, and other structures necessary for gas well development, it must obtain a permit from the DEP.

#### Pipeline

The Federal Energy Regulatory Commission (FERC) regulates interstate and intrastate gas pipelines. Approval from FERC is required for location, construction, operation, and abandonment of pipelines. (See, [www.ferc.gov](http://www.ferc.gov)) . The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration regulates the transportation of natural gas through pipelines. The Pennsylvania Public Utility Commission has regulatory jurisdiction over public utility pipelines within the state.<sup>18</sup>

#### Highway Occupancy Permit

A highway occupancy permit is required from the Pennsylvania Department of Transportation for placing or modifying an access, opening the highway surface, placing a utility facility, or modifying a utility facility.<sup>19</sup>

### Municipal and County Approval

In accordance with state regulations, municipalities and counties have 30 days from receipt of notification of a project's general information form, which answers land use policy questions and is submitted with NPDES and Water Quality Management applications, to notify DEP of any conflicts with the local government's land use policy, such as a zoning ordinance. In addition, every applicant for a new, amended, or renewal NPDES or Water Quality Management Permit must give written notice to each municipality and county in which the activities will be located. The municipalities and counties must receive the notice at least 30 days before the DEP may issue or deny the permit.

Pennsylvania's Oil and Gas Act specifically preempts municipal regulation of natural gas drilling. However, zoning and other land use ordinances may be used to guide development.

Pennsylvania courts have held that the preemption provisions of the Oil and Gas Act did not disable local government's "core municipal function" of designating districts in which land uses may occur. In *Huntley & Huntley v. Borough Council of the Borough of Oakmont*<sup>20</sup> the Borough of Oakmont denied a gas company a conditional use permit to drill and operate a gas well on residential property. The gas company argued that the borough was preempted from restricting the location of the drilling by the Oil and Gas Act. The Pennsylvania Supreme Court held that the Act's preemption language was intended to cover technical aspects of well functioning, not ordinances regarding well placement. In *Range Resources-Appalachia, LLC v. Salem Township*,<sup>21</sup> the court held that the Pennsylvania Oil and Gas Act preempted municipal regulation. However, in this instance, the municipality had enacted comprehensive regulations regarding activities related to gas well drilling, not ordinances regarding well placement. In a recent lower court decision, *Penneco Oil Co. v. County of Fayette*,<sup>22</sup> an appellate court upheld a local zoning ordinance that restricted the placement of oil and gas wells. The court affirmed the lower court's decision finding that a county's zoning ordinance was not preempted by the Oil and Gas Act, because the ordinance pertained to preserving the character of residential neighborhoods and was distinct from the Act's purposes in 58 Pa. Stat. Ann. § 601.102.

### Post-Approval Review and Monitoring

DEP inspectors conduct routine and unannounced inspections of drilling sites and wells statewide. In 2010, the DEP increased its staffing levels to meet inspection needs for Marcellus Shale operations. Other agencies directly responsible for monitoring the effects of drilling on water quality and aquatic life include the Pennsylvania Fish and Boat Commission (monitors drilling sites near waterways and wetlands), the Susquehanna and Delaware River basin commissions, and the U.S. Fish and Wildlife Service.

For information about proposed DEP regulations, policies, and other proposals open for public comment visit:

[www.portal.state.pa.us/portal/server.pt/community/public\\_participation\\_center/14004](http://www.portal.state.pa.us/portal/server.pt/community/public_participation_center/14004)

### III. Frequently Asked Questions

I've heard that hydraulic fracturing utilizes a lot of water. I'm concerned about the impact that may have on the environment. Who can I voice concerns to?

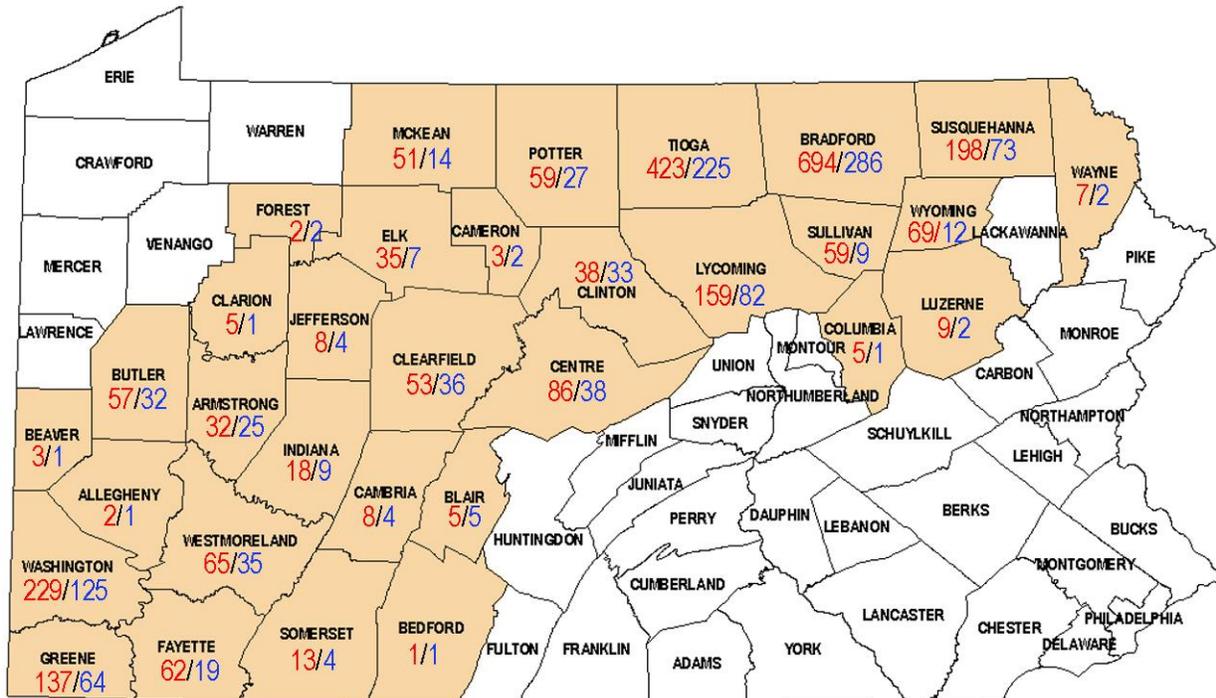
An average of 5 million gallons of "frac water" is used to drill each Marcellus gas well. Removing such large amounts of water from streams could impact the fish and aquatic life by reducing the water's flow and oxygen level or changing the water temperature (particularly in small headwater streams). Depending on the location, the Susquehanna River Basin Commission (SRBC), the Delaware River Basin Commission (DRBC), or common law may regulate water withdrawals. Drilling applicants must describe water withdrawals as part of their water management plans.

#### Authority

##### Common Law

For groundwater withdrawal, Pennsylvania follows the rule of reasonable use, a doctrine developed by American courts that allows a landowner to "use such an amount of water as may be necessary for some useful or beneficial purpose in connection with the land from which it is

**Pennsylvania DEP Permits Issued and Wells Drilled January to October, 2010**



Number of permits issued for counties **is in red (2,595 total)** and number of wells drilled **is in blue (1,177 total)**. Data are from the PA DEP Bureau of Oil and Gas Management and drilling figures were reported by well operators.

taken.”<sup>23</sup> Withdrawals are limited only by the rules against waste and transportation. In *Wheatley v. Baugh*, the Pennsylvania Supreme Court held that a landowner – barring negligence or malice – has the absolute right to exploit percolating groundwaters.<sup>24</sup> The areas in Pennsylvania governed by common law are primarily in the western part of the state and in other basins not covered by the SRBC or DRBC.

#### Water Management Plan

Owners or operators are required to submit a Water Management Plan to the DEP with their well drilling application. The plan should contain information on planned use and withdrawal of source water and monitoring plans, as well as any approvals from the SRBC or the DRBC. The plan should also contain stream impact and flow analysis.

#### The Susquehanna River Basin Commission

SRBC is composed of representatives from New York, Pennsylvania, Maryland, and the federal government and “provides the mechanism to guide the conservation, development, and administration of the water resources of the vast river basin.”<sup>25</sup>

Projects requiring review and approval in the basin include consumptive water use of 20,000 gallons per day (gpd) over a 30-day average (600,000 gallons); water withdrawals of 100,000 gpd over a 30-day average (3,000,000 gallons) and any project which involves a withdrawal from a groundwater or surface water source and which is subject to certain requirements regarding consumptive use.

Project review regulations state that no person may undertake any natural gas well development project in the basin targeting the Marcellus or Utica shale formations without prior review and approval by the Commission.<sup>26</sup> Project review regulations are available at [www.srbc.net/policies/policies.htm](http://www.srbc.net/policies/policies.htm) .

#### The Delaware River Basin Commission

DRBC is composed of representatives from Delaware, New Jersey, Pennsylvania, and New York, as well as federal representatives from the U.S. Army Corps of Engineers.<sup>27</sup> The commission provides water quality protection, water supply allocation, regulatory review (permitting), water conservation initiatives, watershed planning, drought management, and flood loss reduction for the Delaware River Basin.

The DRBC must approve withdrawals from a single well or group of wells equal to a 30 day average of 100,000 gpd; withdrawals from a surface water in excess of a daily average gross of 100,000 gpd for any purpose; withdrawals from a single well or group of wells equal to a daily average gross of 10,000 gpd within the Southeastern Pennsylvania Groundwater; diversions or transfers into or out of the basin with a design capacity in excess of a daily average rate of 100,000 gpd; increased ground or surface water withdrawals; and renewals of a previously approved withdrawal. In 2009, the DRBC determined that natural gas well activities within the drainage area of special protection waters may not commence without DRBC approval, regardless of DRBC thresholds. Project review procedures and regulations are available at

[www.state.nj.us/drbc/regula.htm](http://www.state.nj.us/drbc/regula.htm) . However, the DRBC has voted to put natural gas well activities on hold as it drafts new regulations regarding natural gas drilling.<sup>28</sup>

### ***How can I stay informed or provide comments?***

Sign up for the SRBC’s newsletter, find out about meetings and events, or access other public information at [www.srbc.net/about/index.htm](http://www.srbc.net/about/index.htm). As part of the SRBC’s review, applications for the withdrawal, consumptive water use, or diversion in the basin are subject to the SRBC’s public notice requirements.<sup>29</sup> Applicants must provide notice to affected municipalities, county planning agencies, and contiguous property owners. The SRBC also provides notice in the Federal Register and state bulletins, which runs at least 30 days prior to when the project is scheduled for action on the commission’s meeting agenda. In addition to accepting public comments during that period, the SRBC provides opportunity at a public hearing before it takes action on an application. All approved projects and applications are available online at [www.srbc.net/wrp/Default.aspx](http://www.srbc.net/wrp/Default.aspx) .

The DRBC hosts a project application status page at [www.state.nj.us/drbc/dockets/status.htm](http://www.state.nj.us/drbc/dockets/status.htm) . Questions regarding specific project applications may be addressed to the Water Resources Management Branch staff lead identified in application update. The DRBC publishes notice at least 10 days prior to a hearing date. For more information, please call (609) 883-9500. To sign up to receive notices about public meeting dates and times, visit: [www.state.nj.us/drbc/commeet.htm](http://www.state.nj.us/drbc/commeet.htm) .

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[www.portal.state.pa.us/portal/server.pt/community/public\\_participation\\_center/14004](http://www.portal.state.pa.us/portal/server.pt/community/public_participation_center/14004)

Sign up to receive email notices when changes occur on DEP permits (tracked by county, municipality, program, or individually), DEP draft technical documents, and regulatory proposals. The PA DEP Electronic Notification System, eNotice, sign up is available at:

[www.ahs2.dep.state.pa.us/eNOTICEWeb/Default.aspx](http://www.ahs2.dep.state.pa.us/eNOTICEWeb/Default.aspx)

*Once the well drilling is completed, a pipeline is dug to connect the well to larger gas line “arteries” that supply customers primarily along the east coast. Photo Credit: Steve McConnell, Wayne Independent.*



## **What happens to wastewater from drilling?**

Wastewater from the hydraulic fracturing process may also impact the environment. Millions of gallons of water mixed with sand, salt, and chemicals (often carbonates, methanol, hydrochloric acid, anhydrides, and high concentrations of salt)<sup>30</sup> are pumped into a well to fracture rock. A portion of that frac water, called “frac returns,” is pumped out of the well, while the rest remains underground. The DEP has recently released a list of frac chemicals which is available at [www.dep.state.pa.us/dep/deputate/minres/Oilgas/FractListing.pdf](http://www.dep.state.pa.us/dep/deputate/minres/Oilgas/FractListing.pdf).

Pennsylvania has specific requirements for the safe disposal of wastewater from drilling and fracturing.<sup>31</sup> All well operators are required to develop and implement a plan “for the control and disposal of fluids, residual waste and drill cuttings including tophole water, brines, drilling fluids, additives, drilling muds, stimulation fluids, well servicing fluids, oil, production fluids and drill cuttings from the drilling, alteration, production, plugging or other activity associated with oil and gas wells.”<sup>32</sup> The plan must be consistent with the Oil and Gas Act, the Clean Streams Law, the Solid Waste Management Act, as well as other laws.<sup>33</sup>

Frac water is often stored in an impoundment for later transport to a DEP approved treatment plant. These impoundments present a risk of frac water spilling into waterways or seeping into groundwater. In 2009 Cabot Oil and Gas Corporation was responsible for three spills, totaling about 8,000 gallons of fracturing fluid.<sup>34</sup> The spills polluted Stevens Creek and a nearby wetland. DEP fined the company \$56,650 citing violations of the Clean Streams Law, the Solid Waste Management Act, and the Oil and Gas Act.

The discharge of treated frac water into waterways also presents a risk of elevating the total dissolved solids (TDS), a mixture of salt and other minerals, thus affecting the health of aquatic organisms in the receiving rivers and streams. Storm water runoff from surfaces around well drilling activities can be another source of TDS.

The DEP’s Wastewater Treatment Standards outlines the foundation and scientific rationale for rules and regulations to prevent TDS, sulfate and chloride pollution in the Commonwealth’s waters. The standards, adopted in the summer of 2010,<sup>35</sup> require wastewater discharges from drilling operations to meet lower concentration thresholds. The new limit for discharges of wastewater from gas drilling facilities is 500 milligrams per liter (mg/l) and 250 mg/l for chlorides.

### ***How can I provide comments?***

Contact the nearest DEP Regional Office if you suspect drilling or any other earth disturbance activities have harmed water resources or the environment. Regional office phone numbers are online at [www.depweb.state.pa.us](http://www.depweb.state.pa.us).

The EPA has created a tip line for citizens to report non-emergency, suspicious activity related to oil and natural gas development. The agency is asking citizens who think they’ve observed illegal disposal of wastes or other suspicious activity to call 1-877-919-4EPA. Reports may also

be sent to [eyesondrilling@epa.gov](mailto:eyesondrilling@epa.gov). Emergency situations should be reported to the National Response Center at 800-424-8802.

### *How can I stay informed?*

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To subscribe to the PA DEP Marcellus Shale Examiner, visit:

[www.ahs2.dep.state.pa.us/centrallistmanager/default.aspx?id=6](http://www.ahs2.dep.state.pa.us/centrallistmanager/default.aspx?id=6)



*One of the many drilling pads in Bradford County, Pa. Rigs like this one are becoming a common sight in the Marcellus region of Pennsylvania.*

## **I've heard that fracking can contaminate drinking water. What steps are being taken to protect well water?**

Groundwater is an important resource for wetlands, streams, rivers, and other habitats. Groundwater also provides a source of freshwater for irrigation, industry, and communities. In Pennsylvania, more than one billion gallons of groundwater are pumped from aquifers throughout the state for various uses.<sup>36</sup> More than half of this groundwater is used for domestic drinking water supplies.<sup>37</sup> Pennsylvania has more than one million private water wells supplying water to more than three million rural residents.<sup>38</sup> An additional 20,000 new private wells are drilled each year around the state.<sup>39</sup>

As discussed above, many Pennsylvanians are concerned about the risk of untreated frac water spilling into waterways or seeping into groundwater. In addition, gas migration from wells can lead to groundwater and drinking water contamination.<sup>40</sup> At least thirteen families in Dimock are unable to drink their well water because of natural gas contamination.<sup>41</sup> The DEP has fined Cabot, the responsible company, nearly \$200,000 in connection with Dimock spills and well water contamination.<sup>42</sup>

In Pennsylvania, any abandoned oil and gas well must be plugged or the owner is liable for fines and legal action by the state.<sup>43</sup> Pennsylvania law requires drillers to case and grout wells through all fresh water aquifers before drilling through to deeper deposits of oil or gas.<sup>44</sup> This casing is intended to protect groundwater from pollutants inside the well, and keep water from the surface and other geologic strata from mixing with and contaminating groundwater.<sup>45</sup> The Pennsylvania Environmental Quality Board (EQB) has published proposed rulemaking measures ([www.pabulletin.com/secure/data/vol40/40-28/1248.html](http://www.pabulletin.com/secure/data/vol40/40-28/1248.html)) to strengthen existing state requirements for drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells. The rules update well construction standards and address responsibility for gas migration issues. The rules also require well operators to perform quarterly inspections of all wells and report these results to the DEP. The proposed rulemaking was open for public comment until August 9, 2010. Following the public comment period, the Pennsylvania Independent Regulatory Review Commission will review the proposed regulations before final publication.

State law also requires drilling operators to replace or restore water supplies affected by drilling.<sup>46</sup> DEP will investigate complaints within 10 days and issue orders as necessary.<sup>47</sup>

The federal Safe Drinking Water Act regulates the nation's supply of public drinking water for public water systems that serve at least 25 people per day for 60 days of the year or that have at least 15 service connections. The Act authorizes the EPA to set national standards governing the maximum acceptable levels of water contaminants in public water systems and oversees the states, localities, and water suppliers who implement those standards. In 2005, § 300h(1)(d)(B) of the Act was amended to specifically exclude hydraulic fracturing from regulation. Under the Act, states are authorized to set their own standards, as long as the programs are approved by the EPA. While the Act regulates underground extraction processes and requires states developing regulations to develop underground injection control programs, hydraulic fracturing is exempt from regulation.<sup>48</sup> In March 2010, the EPA announced that it would perform a study to determine the effects of hydraulic fracturing on water supplies.<sup>49</sup>

Water quality is also monitored by the DEP and the Susquehanna and Delaware River Basin Commissions (please see previous section). In addition, Water Management Plans submitted to the DEP with well drilling application must contain any necessary approvals from the Commissions and must provide monitoring plans.

***Where do I go for more information about drinking water concerns?***

Contact the nearest DEP Regional Office if you suspect drilling or any other earth disturbance activities have harmed water resources or the environment. Regional office phone numbers are online at [www.depweb.state.pa.us](http://www.depweb.state.pa.us).

The EPA has created a tip line for citizens to report suspicious activity related to oil and natural gas development. The agency is asking citizens to call 1-877-919-4EPA if they observe what appears to be an illegal disposal of wastes or other suspicious activity. Reports may also be sent to [eyesondrilling@epa.gov](mailto:eyesondrilling@epa.gov). Emergency situations should be reported to the National Response Center at 800-424-8802.

***How can I stay informed?***

To check safe drinking water data in your water system, visit [http://oaspub.epa.gov/enviro/sdw\\_form\\_v2.create\\_page?state\\_abbr=PA](http://oaspub.epa.gov/enviro/sdw_form_v2.create_page?state_abbr=PA).

Visit the DEP’s Drinking Water Management page for more information [www.depweb.state.pa.us/portal/server.pt/community/drinking\\_water\\_management/10543](http://www.depweb.state.pa.us/portal/server.pt/community/drinking_water_management/10543).



*A well managed drilling operation carefully contains the pit or frac water for reuse or treatment when it can no longer be used. Many millions of gallons of freshwater are used to drill each well.*

## **What can I do about the noise and aesthetic impacts from drilling?**

Noise from oil and gas drilling may affect nearby residents. Noise may rise to a level constituting a “nuisance” under common law tort doctrine. A nuisance is “[a]n activity that arises from unreasonable, unwarranted, or unlawful use by a person of his own property which causes injury to another or the public.”<sup>50</sup> As stated by a Pennsylvania court,

*One is subject to liability for a private nuisance if, but only if, his conduct is a legal cause of an invasion of another’s interest in the private use and enjoyment of land, and the invasion is either (a) intentional and unreasonable, or (b) unintentional and otherwise actionable under the rules controlling liability for negligent or reckless conduct, or for abnormally dangerous conditions or activities. A defendant is not subject to liability for an invasion unless it resulted in a significant harm to the complaining party. Significant harm is defined as harm, of a kind that would be suffered by a normal person in the community or by property in normal condition and used for a normal purpose.*<sup>51</sup>

Pennsylvania courts have found that residents near industrial plants must “to some extent bear the annoyance and injury of smoke, odors and gases and noise.”<sup>52</sup> However, “noises which constitute an annoyance to a person of ordinary sensibilities to sound, so as to materially interfere with the ordinary comforts of life and impair the reasonable enjoyment of habitation, are a nuisance.”<sup>53</sup> So to stop a drilling nuisance, a resident would have to prove that the noise or other activity presented an unreasonable interference of their life.

### ***What can I do about aesthetic impacts from drilling?***

Drilling may also change or spoil residents’ views, which can have a negative impact on the enjoyment and value of their land. Landowners have brought suit to protect their property views. And, while states consider view obstruction in eminent domain proceedings and municipalities may protect aesthetics in zoning regulations, courts “have generally maintained their refusal to extend judicial protection to view rights.”<sup>54</sup>

### ***If I’m concerned about the noise, who should I call?***

The Pennsylvania Office of General Attorney may be a helpful place to start. To contact, call (717) 787-3391 or visit <http://www.attorneygeneral.gov/theoffice.aspx?id=71>

## What effects might drilling have on my land?

Although permitting for erosion and sediment control was originally managed by the county soil conservation districts, the DEP now controls permitting. Companies must prepare erosion and sediment control plans to include with well drilling permits. The plans must comply with soil conservation best management practices to minimize the amount of sediment leaving the disturbed area. Pennsylvania's oil and gas regulations, Pa Code Chapter 78.53, incorporate the Chapter 102 regulations by reference. The Department of Environmental Protection (DEP) is responsible for the administration and enforcement of Chapters 102 and 78 regulations and the Clean Streams Law.<sup>55</sup> For oil and gas activities that disturb 5 or more acres of soil, a DEP Erosion and Sediment Control Permit (ESCGP-1) is required.

## Who can I contact about a soil disturbance concern?

Contact the nearest DEP Regional Office if you suspect drilling or any other earth disturbance activities have harmed water resources or the environment. Regional office phone numbers are online at [www.depweb.state.pa.us](http://www.depweb.state.pa.us).

The EPA has created a tip line for citizens to report non-emergency suspicious activity related to oil and natural gas development. The agency is asking citizen who observe what appears to be an illegal disposal of wastes or other suspicious activity to call 1-877-919-4EPA. Reports may also be sent to [eyesondrilling@epa.gov](mailto:eyesondrilling@epa.gov). Emergency situations should be reported to the National Response Center at (800) 424-8802.

## How can I stay informed?

Sign up to receive email notices when changes occur on DEP permits (tracked by county, municipality, program, or individually), DEP draft technical documents, and regulatory proposals. The PA DEP Electronic Notification System, eNotice sign up is available at: [www.ahs2.dep.state.pa.us/eNOTICEWeb/Default.aspx](http://www.ahs2.dep.state.pa.us/eNOTICEWeb/Default.aspx)

For information about proposed DEP regulations, policies and other proposals open for public comment visit:

[www.portal.state.pa.us/portal/server.pt/community/public\\_participation\\_center/14004](http://www.portal.state.pa.us/portal/server.pt/community/public_participation_center/14004)

Gravel access road for gas well in Tioga County, PA.

Source:

<http://sites.google.com/site/naturalgasforum/classroom-resources/water-resources-and-the-marcellus-shale/water-quality>



## How can drilling activities affect forests?

Pennsylvania is known for its vast forestland. As gas drilling has progressed, approximately 700,000 acres of private and 139,000 of public forestlands have been leased for drilling purposes since 2008. The Department of Conservation and Natural Resources Bureau of Forestry is responsible for managing state forestlands, including the natural gas leasing process.<sup>56</sup> Leases are awarded through a competitive bidding process.<sup>57</sup> The Bureau reviews potential environmental impacts of the drilling process and manages these impacts through avoiding, buffering or minimizing impacts or through reclamation.<sup>58</sup> The DEP issues necessary permits and performs additional environmental review.

Despite the environmental review process, some citizens and environmentalists are concerned that drilling in the forest, with the construction of access roads, wells, and pipelines, will fragment the forest and damage the environment. For example, drilling activities in the forests may isolate populations of species, change habitat conditions, as well as contribute to erosion that degrades water quality. The noise and visual impacts can also detract from recreational use of the forests.

### ***Where do I go for more information on natural gas exploration on state forestlands?***

Visit [www.dcnr.state.pa.us/forestry/marcellus/index.html](http://www.dcnr.state.pa.us/forestry/marcellus/index.html) or call the DCNR 717-787-2703.

### ***How do I track permitting or regulatory developments in forest areas?***

Sign up to receive email notices when changes occur on DEP permits (tracked by county, municipality, program, or individually), DEP draft technical documents, and regulatory proposals. eNotice, the PA DEP Electronic Notification System, eNotice, sign up is available at: [www.ahs2.dep.state.pa.us/eNOTICEWeb/Default.aspx](http://www.ahs2.dep.state.pa.us/eNOTICEWeb/Default.aspx)

*A Marcellus Shale drilling site in Pennsylvania's forests.*

*Photo Credit: Paul Zeph, Pennsylvania Sea Grant.*



## **Can drilling activities introduce aquatic invasive species?**

When an invasive algal bloom overtook 43 miles of Dunkard Creek in Greene County, Pennsylvania and Monongalia County, West Virginia thousands of fish, mussels, aquatic insects, and salamanders died.<sup>59</sup> An EPA report suggested that discharges from nearby mines (some of which stored spent fracking water) increased the creek's total dissolved solids (TDS) creating the perfect conditions for golden algae to thrive.<sup>60</sup> While it is unclear if the spill contained fracking water or exactly how the non-native golden alga was introduced, some have suggested it arrived on gas drilling equipment transported from another state.<sup>61</sup>

In addition to changing habitat that may facilitate the growth of invasive species, drilling activities may spread aquatic invasive species along with water transfers or discharges. For example, drilling activities could transport zebra mussels or their larvae to uninfested waterways. Without taking proper precautions, gas well construction also has the potential of spreading Didymo, purple loosestrife, Hydrilla, Eurasian watermilfoil, and many others.

Pennsylvania has invasive species regulations making it illegal to introduce certain live species. The Pennsylvania Department of Agriculture (PDA) has a Noxious Weed Law that contains a noxious weed control list, maintained by a Noxious Weed Control Committee. The law makes it illegal to sell, transport, plant or otherwise propagate that weed within the state.<sup>62</sup> If a landowner refuses to comply with orders to remove noxious weeds, he may face a misdemeanor. The Plant Pest Act authorizes the PDA to take measures to detect, contain, and eradicate plant pests.

Laws administered by the Pennsylvania Fish and Boat Commission (PFBC) make it unlawful to sell, offer for sale, purchase, possess, introduce, import or transport live rusty crayfish or snakehead fish in Pennsylvania and to propagate, stock, transport or import other fish, such as carp, bighead carp, silver carp, zebra mussel, quagga mussel, European rudd, rusty crayfish, ruffe, round goby and tubenose goby.<sup>63</sup>

Enforcement of laws protecting biodiversity by other state agencies, including DEP and DCNR, help prevent the introduction of invasive species. Federal laws administered by the USDA, the Fish and Wildlife Service, the Coast Guard, and the Department of the Interior also regulate invasive species.

### ***Who can I contact with questions and concerns regarding aquatic invasive species?***

Contact your regional PFBC office (directory available at [www.fish.state.pa.us](http://www.fish.state.pa.us)) or the DEP at 1-800-541-2050.

## What effect can drilling activities have on air quality?

Exhaust fumes from construction and drilling equipment and the release of the various gases in the shale formation can be a concern for landowners near gas drilling sites and compressors. The DEP Bureau of Air Quality is responsible for administering the federal Clean Air Act and the Pennsylvania Air Pollution Control Act. Air quality permits are granted for each point source. Each piece of machinery used in drilling is considered a point source, and they typically meet DEP standards, although many small sources of air pollution could constitute an aggregate pollution.<sup>64</sup>

To view a PowerPoint presentation “Air Quality Issues Applicable to Marcellus Shale Gas” by the Bureau of Air Quality on air quality issues in connection with Marcellus Shale drilling visit [www.portal.health.state.pa.us/portal/server.pt/gateway/PTARGS\\_0\\_2\\_847401\\_0\\_0\\_18/Air%20Quality%20Issues%20Applicable%20to%20Marcellus%20Shale%20Gas2.ppt](http://www.portal.health.state.pa.us/portal/server.pt/gateway/PTARGS_0_2_847401_0_0_18/Air%20Quality%20Issues%20Applicable%20to%20Marcellus%20Shale%20Gas2.ppt)

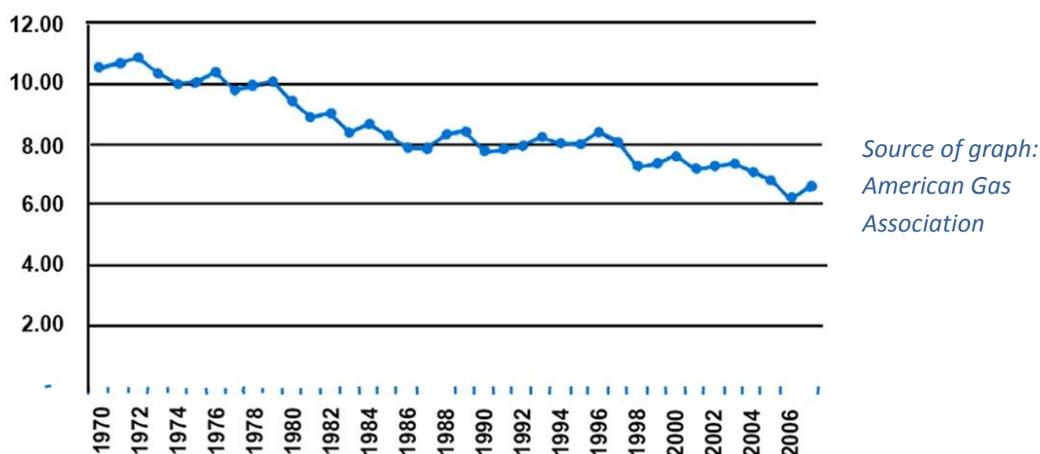
### *What can I do about an air quality concern?*

To review the American Lung Association’s Air Quality Report Card for your county, visit [www.stateoftheair.org/2010/states/pennsylvania](http://www.stateoftheair.org/2010/states/pennsylvania) . Contact your DEP regional office or local county health department to report any concerns you may have.

### *For more information on air programs:*

Visit [www.depweb.state.pa.us/portal/server.pt/community/air/6000](http://www.depweb.state.pa.us/portal/server.pt/community/air/6000) ,or contact the DEP Bureau of Air Quality for more information [www.dep.state.pa.us/dep/deputate/airwaste/aq/default.htm](http://www.dep.state.pa.us/dep/deputate/airwaste/aq/default.htm) .

## Tons of CO2 Emissions\* Per Residential and Commercial Natural Gas Customer



Source of graph:  
American Gas  
Association



\*From consumption of natural gas only

Source: Calculated from Energy Information Administration data

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## For More Information:

**Penn State Extension Natural Gas Impacts:** <http://extension.psu.edu/naturalgas>

- **Marcellus Shale: What Local Government Officials Need to Know:** <http://downloads.cas.psu.edu/naturalgas/pdf/MarcellusShaleWhatLocalGovernmentOfficialsneedtoknow.pdf>
- **Legal Issues:** <http://extension.psu.edu/naturalgas/issues/legal-issues>
- **Presentations:** <http://extension.psu.edu/naturalgas/presentations>

**PA DEP Marcellus Shale Information:**

[www.dep.state.pa.us/dep/deputate/minres/oilgas/new\\_forms/marcellus/marcellus.htm](http://www.dep.state.pa.us/dep/deputate/minres/oilgas/new_forms/marcellus/marcellus.htm)

- The **DEP Daily Update** newsletter contains information on legislation, regulations, policies and other proposals in the making, along with a meeting calendar: [www.depweb.state.pa.us/portal/server.pt/community/newsroom/14287](http://www.depweb.state.pa.us/portal/server.pt/community/newsroom/14287)
- **Marcellus Shale Fact Sheet:** [www.elibrary.dep.state.pa.us/dsweb/Get/Document-77964/0100-FS-DEP4217.pdf](http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77964/0100-FS-DEP4217.pdf)
- **Environment Facility Application Compliance Tracking System (eFACTS)** is a free, online tool that allows the public to search for operators, facilities/sites, permits, and the like for each of the programs that PA DEP regulates, including Oil and Gas Management: [www.dep.state.pa.us/dep/efacts](http://www.dep.state.pa.us/dep/efacts)
- **The Marcellus Shale Examiner** follows developments related to natural gas exploration in Pennsylvania. Sign up to receive emails at: [www.ahs2.dep.state.pa.us/centrallistmanager/default.aspx?id=6](http://www.ahs2.dep.state.pa.us/centrallistmanager/default.aspx?id=6)
- **Items open for public review**, go to Regulations [www.portal.state.pa.us/portal/server.pt?open=514&objID=589192&mode=2](http://www.portal.state.pa.us/portal/server.pt?open=514&objID=589192&mode=2)
- **Proposals Open for Comment:** [www.portal.state.pa.us/portal/server.pt?open=514&objID=589185&mode=2](http://www.portal.state.pa.us/portal/server.pt?open=514&objID=589185&mode=2)

**FERC Citizen Involvement Information:** [www.ferc.gov/for-citizens/get-involved.asp](http://www.ferc.gov/for-citizens/get-involved.asp)

**Pennsylvania Bulletin List of Permit Applications Open for Public Comment:**

[www.pabulletin.com](http://www.pabulletin.com)

**DCNR Marcellus Shale Information:** [www.dcnr.state.pa.us/topogeo/oilandgas/marcellus.aspx](http://www.dcnr.state.pa.us/topogeo/oilandgas/marcellus.aspx)

**SRBC Marcellus Shale Information:** [www.srbc.net/programs/projreviewmarcellus.htm](http://www.srbc.net/programs/projreviewmarcellus.htm)

**DRBC Marcellus Shale Information:** [www.state.nj.us/drbc/naturalgas.htm](http://www.state.nj.us/drbc/naturalgas.htm)

**League of Women Voters of Pennsylvania - Marcellus Shale Natural Gas: From the Ground to the Customer:**

<http://palwv.org/issues/MarcellusShale/Marcellus%20Shale%20Study%20Guide%20Parts%201-5.pdf>

**Penn State University Extension:** <http://extension.psu.edu/naturalgas/>;  
<http://extension.psu.edu/water/marcellus-shale> .

Penn State University Extension Webinars: <http://extension.psu.edu/naturalgas/webinars> .

## Endnotes (References)

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- <sup>1</sup> U.S. Energy Information Administration, FAQ—Natural Gas, [http://tonto.eia.doe.gov/ask/ng\\_faqs.asp#us\\_consumption](http://tonto.eia.doe.gov/ask/ng_faqs.asp#us_consumption) .
- <sup>2</sup> PA DEP’T OF ENVTL. PROT., DRILLING FOR NATURAL GAS IN THE MARCELLUS SHALE FORMATION: FREQUENTLY ASKED QUESTIONS, [www.elibrary.dep.state.pa.us/dsweb/Get/Document-77964/0100-FS-DEP4217.pdf](http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77964/0100-FS-DEP4217.pdf) .
- <sup>3</sup> *Id.* “Frac” is used as an abbreviation for the hydraulic fracturing process.
- <sup>4</sup> PA. DEP’T OF ENVTL. PROT., MARCELLUS SHALE, [www.elibrary.dep.state.pa.us/dsweb/Get/Document-77964/0100-FS-DEP4217.pdf](http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77964/0100-FS-DEP4217.pdf) .
- <sup>5</sup> *Id.*
- <sup>6</sup> *Id.*
- <sup>7</sup> [www.legis.state.pa.us/WU01/LI/CSM/2009/0/235.pdf](http://www.legis.state.pa.us/WU01/LI/CSM/2009/0/235.pdf) .
- <sup>8</sup> [www.legis.state.pa.us/WU01/LI/CSM/2009/0/5114.pdf](http://www.legis.state.pa.us/WU01/LI/CSM/2009/0/5114.pdf) .
- <sup>9</sup> PA. DEP’T OF ENVTL. PROT., *supra* note 4.
- <sup>10</sup> 58 PA. STAT. ANN. §§ 601.101-601.607.
- <sup>11</sup> 58 PA. STAT. ANN. §§ 601.201, 601.215.
- <sup>12</sup> PA. DEP’T OF ENVTL. PROT., *supra* note 4.
- <sup>13</sup> 58 PA. STAT. ANN. § 601.205.
- <sup>14</sup> 58 PA. STAT. ANN. § 601.201.
- <sup>15</sup> *Id.*
- <sup>16</sup> More information on erosion and sediment control plans and permits is available at: [www.elibrary.dep.state.pa.us/dsweb/Get/Document-72023/5500-FS-DEP4216.pdf](http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-72023/5500-FS-DEP4216.pdf) ; [www.elibrary.dep.state.pa.us/dsweb/Get/Document-77632/5500-FM-OG0111.pdf](http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77632/5500-FM-OG0111.pdf)
- <sup>17</sup> The EPA regulates injection wells through the UIC program, as provided in the Safe Drinking Water Act. Each state must have a UIC program and while states may assume responsibility for those programs, the EPA implements the UIC program in Pennsylvania.
- <sup>18</sup> PA. PUBLIC UTILITIES COMMISSION, [www.puc.state.pa.us/](http://www.puc.state.pa.us/) .
- <sup>19</sup> PA. DEP’T OF TRANSP., OCCUPANCY PERMIT INFORMATION, [www.dot.state.pa.us/Internet/Bureaus/pdBHSTE.nsf/BHSTHomepage?openframeset&frame=main&src=infoOccupancyPermits?OpenForm](http://www.dot.state.pa.us/Internet/Bureaus/pdBHSTE.nsf/BHSTHomepage?openframeset&frame=main&src=infoOccupancyPermits?OpenForm) .
- <sup>20</sup> 600 Pa. 207 (2009).
- <sup>21</sup> 600 Pa. 231 (Pa. 2009).
- <sup>22</sup> 2010 Pa. Commw. LEXIS 397 (Pa. Commw. Ct. July 22, 2010).
- <sup>23</sup> Matt Berkowitz, *Bottling the Water Bottlers: A Critique of Pennsylvania Groundwater Law*, 22 TEMP. ENVTL. L. & TECH. J. 235, 242 (2004).
- <sup>24</sup> *Wheatley v. Baugh*, 25 Pa. 528, 533 (1855).
- <sup>25</sup> Susquehanna River Basin Commission Regulation of Projects, 18 C.F.R. §§ 801.0-808.19 (2009).
- <sup>26</sup> *Id.*
- <sup>27</sup> DELAWARE RIVER BASIN COMMISSION, [www.state.nj.us/drbc/](http://www.state.nj.us/drbc/)
- <sup>28</sup> Sandy Bauers, *Some Marcellus Drilling Put on Hold*, THE PHILADELPHIA INQUIRER, May 6, 2010.
- <sup>29</sup> SUSQUEHANNA RIVER BASIN COMMISSION, PUBLIC NOTICE GUIDELINES, <http://srbc.net/forms/docs/Public%20Notice%20Guidelines%20with%20Attachments.PDF> .
- <sup>30</sup> Drilling companies must disclose the names of all chemicals to be stored and used at a drilling site in the Pollution Prevention and Contingency Plan that must be submitted to DEP as part of the permit application process. These plans contain copies of material safety data sheets for all chemicals, and DEP recommends to operators that a copy be kept on each well site. This information is on file with DEP and is available to landowners, local governments and emergency responders. PA DEP’T OF ENVTL. PROT., DRILLING FOR NATURAL GAS IN THE MARCELLUS SHALE FORMATION: FREQUENTLY ASKED QUESTIONS, [www.elibrary.dep.state.pa.us/dsweb/Get/Document-77964/0100-FS-DEP4217.pdf](http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77964/0100-FS-DEP4217.pdf) .
- <sup>31</sup> 25 PA. CODE §§ 78.55, 78.57.
- <sup>32</sup> *Id.*
- <sup>33</sup> *Id.*

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- <sup>34</sup> Rona Kobell, *Marcellus Shale: Pipe Dreams in Pennsylvania?* CHESAPEAKE BAY JOURNAL, December 2009.
- <sup>35</sup> 10 Pa. Bull. 1228 (June 17, 2010).
- <sup>36</sup> PENN STATE COLLEGE OF AGRICULTURAL SCIENCES, A QUICK GUIDE TO GROUNDWATER IN PENNSYLVANIA, <http://pubs.cas.psu.edu/FreePubs/pdfs/uh183.pdf> .
- <sup>37</sup> *Id.*
- <sup>38</sup> *Id.*
- <sup>39</sup> *Id.*
- <sup>40</sup> PITTSBURGH GEOLOGICAL SOCIETY, NATURAL GAS MIGRATION PROBLEMS IN WESTERN PENNSYLVANIA, [www.pittsburghgeologicalsociety.org/naturalgas.pdf](http://www.pittsburghgeologicalsociety.org/naturalgas.pdf) .
- <sup>41</sup> Kobel, *supra* note 34.
- <sup>42</sup> *Id.*
- <sup>43</sup> 58 PA. STAT. ANN. § 601.210.
- <sup>44</sup> 58 PA. STAT. ANN. § 7; 25 PA. CODE § 78.87.
- <sup>45</sup> [www.dep.state.pa.us/dep/deputate/minres/oilgas/new\\_forms/marcellus/MarcellusFAQ.pdf](http://www.dep.state.pa.us/dep/deputate/minres/oilgas/new_forms/marcellus/MarcellusFAQ.pdf)
- <sup>46</sup> 58 PA. STAT. ANN. § 601.208.
- <sup>47</sup> *Id.*
- <sup>48</sup> 42 U.S.C. § 300h
- <sup>49</sup> Press Release, EPA, EPA Initiates Hydraulic Fracturing Study: Agency Seeks Input from Science Advisory Board, March 18, 2010 <http://yosemite.epa.gov/opa/admpress.nsf/d0cf6618525a9efb85257359003fb69d/ba591ee790c58d30852576ea004e3ad!OpenDocument> .
- <sup>50</sup> Restatement (Second) of Torts § 821B(1) (1979); *See* Dumm v. Dahl, 2006 PA Super 326 (Pa. Super. Ct. 2006).
- <sup>51</sup> Dumm v. Dahl, 2006 PA Super 326 (Pa. Super. Ct. 2006).
- <sup>52</sup> 36 P.L.E., NUISANCE § 11 “No one is entitled to absolute quiet in the enjoyment of his property; he may only insist upon a degree of quietness consistent with the standard of comfort prevailing in the locality in which he dwells.” *Collins v. Wayne Iron Works*, 227 Pa. 326, 331 (Pa. 1910).
- <sup>53</sup> 36 P.L.E., NUISANCE § 11.
- <sup>54</sup> Stephen Christopher Unger, *Ancient Lights in Wrigleyville: An Argument for the Unobstructed View of a National Pastime*, 38 IND. L. REV. 533, 549-550 (2005).
- <sup>55</sup> PA DEP’T OF ENVTL. PROT., EROSION AND SEDIMENT CONTROL REQUIREMENTS FOR OIL AND GAS ACTIVITIES, [www.elibrary.dep.state.pa.us/dsweb/Get/Document-72023/5500-FS-DEP4216.pdf](http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-72023/5500-FS-DEP4216.pdf) .
- <sup>56</sup> PA DEP’T OF CONSERVATION AND NATURAL RES., NATURAL GAS EXPLORATION ON STATE FOREST LANDS, [www.dcnr.state.pa.us/forestry/marcellus/index.html](http://www.dcnr.state.pa.us/forestry/marcellus/index.html) .
- <sup>57</sup> PA DEP’T OF CONSERVATION AND NATURAL RES., GAS LEASING POLICY AND PROCESS, [www.dcnr.state.pa.us/forestry/marcellus/policy.html](http://www.dcnr.state.pa.us/forestry/marcellus/policy.html) .
- <sup>58</sup> *Id.*
- <sup>59</sup> Don Hopey, *EPA Pins Killing of Dunkard Creek on Mine Discharges*, PITTSBURGH POST-GAZETTE, Dec. 03, 2009.
- <sup>60</sup> *Id.* *See* Pam Kasey, *Agencies Probe Salty Water in Dunkard Creek Fish Kill*, ABC WTRF, Oct. 15 2009, available at [www.wtrf.com/story.cfm?func=viewstory&storyid=68480](http://www.wtrf.com/story.cfm?func=viewstory&storyid=68480). (discussing whether the elevated TDS levels were from coalbed methane or gas well drilling brine).
- <sup>61</sup> Don Hopey, *Toxins Tied to Fish Kill May Have Hitchhiked*, PITTSBURGH POST-GAZETTE, Oct. 4, 2009.
- <sup>62</sup> 7 PA. CODE § 110.0 (2010).
- <sup>63</sup> 58 PA. CODE §§ 63.46, 71.6, 73.1 (2010).
- <sup>64</sup> League of Women Voters of Pennsylvania, *Regulation and Permitting of Marcellus Shale Drilling* (2009).

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