Marcellus Shale Drilling Comparative White Paper

The Regulatory Approaches of New York, Ohio, Pennsylvania, and West Virginia

Prepared by Travis L. Brannon & Walton C. Shepherd, Research Assistants
Under the Supervision of James M. Van Nostrand, J.D., LL.M., Director

Spring 2012

The Center for Energy and Sustainable Development is an energy and environmental public policy and research organization at the WVU College of Law. The Center focuses on promoting practices that will balance the continuing demand for energy resources—and the associated economic benefits—alongside the need to reduce the environmental impacts of developing the earth's natural resources.

This project is funded by a grant from the West Virginia University Advanced Energy Initiative.

Table of Contents

Introduction

The discovery of vast natural gas reserves in the Marcellus shale, coupled with the increased use of horizontal drilling techniques, has unleashed a "gas rush" in New York, Ohio, Pennsylvania, and West Virginia ("Marcellus States"). While vertical oil and gas drilling has persisted in these states for well over 100 years, dramatic advances in fracturing capabilities in the past decade present a number of concerns for both industry and local citizen interests. The Marcellus States were suddenly presented with the opportunity for increased tax revenues and job availability. A favorable business and operating climate for the oil and gas companies must also be balanced with the land, water, and health concerns of state citizens. Yet, the law often moves slowly, often following behind the faster pace of business. Most of the states with Marcellus wells have been playing catch-up to the influx of natural gas development. The older oil and gas statutes left multiple concerns unaddressed or woefully outdated. Recently, the Marcellus States have all engaged in varying degrees of oil and gas regulatory reform. The issues of hydraulic fracturing, forced pooling, water management, waste disposal, and air quality have ignited much public discussion. Alongside the economic imperatives of an economic downturn, the states have been driven into political action.

The regulatory approaches of the Marcellus States address these issues and concerns in differing ways. Some states chose to completely overhaul large sections of their oil and gas statutes, while others relied more heavily on the promulgation of administrative rules to supplement original statutes. This White Paper seeks to present a concise and summarized "snap shot" of these regulatory approaches as of March 2012. Each state's approach is briefly discussed and followed by a summary chart for quick reference. This White Paper does not present the entirety of each state's oil and gas law. The areas discussed within the White Paper are common areas of interest and are not meant to be exhaustive. The footnotes of this White Paper may prove useful to anyone seeking a more detailed answer regarding the regulatory approach of any particular state.

New York Regulation of Marcellus Shale Drilling

New York's Marcellus shale drilling (known in New York as high volume hydraulic fracturing, or "HVHF") will be regulated by forthcoming modifications and additions to the New York Department of Environmental Conservation's ("DEC") existing regulations under 6 New York Compilation of Codes, Rules, & Regulations Parts 52, 190, 550-556, 560 and 750. This promulgation will also update the DEC's State Pollutant Discharge Elimination System ("SPDES") for the disposal of fracking fluid. The forthcoming rules (for which the required public comment period ended in January 2012) provide very detailed well construction, site prep, operational and maintenance requirements for HVHF wells, as well as updated spacing requirements. The Director does not have the authority to promulgate any further rules without providing notice and public hearing.[1] The New York City and Syracuse watersheds were not included in the DEC's generic EIS, which has the effect of eliminating HVHF drilling activity from those two watersheds. The following discussion includes a variety of commonly searched topics regarding New York's proposed regulations.

New York's **permit requirements** seek to provide a comprehensive disclosure of information. An application for a permit must include the following: the estimated maximum depth and elevation of potential underground fresh water; the proposed volume and source of water to be used and the status of the approvals/permits necessary to withdraw such water; the distance from the well and well pad to any water supply or well, community or private, within 2,640 feet, or from any aquifer boundary, stream, wetland lake or pond within 660 feet; the drill cutting disposal plan; the blowout preventer use and test plan; a description of invasive species and native plant cover, and the best management practices to be employed thereof; and a reclamation plan and a transportation plan including planned route and estimated number of truck trips.[2] A comprehensive map is required as well, including a plan view of the wellbore, a topographic map of the area within at least 2,640 feet of the well, a map of all occurrences of invasive species, and a plan view drawing of the partial reclamation plan.[3] Each permit application must include identification and volume of each chemical additive to be used in fracturing and documentation that proposed additives have no feasible, less potentially toxic

[1] 6 N.Y. COMP. CODES R. & REGS. § 550.4 (May 28, 1985).
[2] 6 N.Y. COMP. CODES R. & REGS. § 560.3(a) (proposed September 28, 2011).
[3] *Id.* § 560.3(b).

alternatives. This information on chemical additives will be disclosed to the public, except that operators may request that such information be exempt from public disclosure.[4]

Forced pooling (known as compulsory integration in New York) is covered by existing New York state law, and no changes are proposed. The owners of 60 percent of the acreage in the proposed drilling unit must agree to lease their land before the state oil and gas board will consider a driller's petition for compulsory integration.[5] There are also no proposed changes for the rules providing for voluntary integration and unitization.[6]

Spacing requirements in the proposed rules range from 330 feet to 1,500 feet from another unit's boundary, such lengths depending on the depth of the producing pool.[7]

The **well pad location restrictions and setbacks** forbid wells to be drilled within 500 feet of private water wells or within 500 feet of the boundary of a primary aquifer (as measured from the edge of the well pad). No edge of a well pad may come within a 100-year floodplain, or within 2,000 feet of any public water supply well, reservoir, natural or manmade lake, or river/stream intake.[8] No drilling may be conducted upon any state land.[9] Well pads are also prohibited within 4,000 feet of any unfiltered surface water supply watershed.[10] Under already-existing rules, no well may be located within 100 feet of an occupied dwelling (unless waived) or within 150 feet of any public building or area.[11]

Water well testing prior to drilling is required of any residential well within 2,000 feet of the well pad, and results must be provided to the owner of the well within 30 days.[12]

Financial security (which operates in the same manner as performance bonds) is required in the amount estimated to plug the well in accordance with the specific DEC plugging requirements.[13] That amount may not exceed $250,000, and if the operator concurrently drills more than one well, the total amount may not exceed $2,000,000.[14]

---

[4] *Id.* § 560.3(c).
[5] N.Y. ENVTL. CONSERV. LAW § 23-0901 (McKinney 2005).
[6] *Id.* § 23-0701.
[7] 6 N.Y. COMP. CODES R. & REGS. § 553.1 (proposed September 28, 2011).
[8] *Id.* § 560.4.
[9] *Id.* § 52.3.
[10] *Id.* § 750-3.3.
[11] 6 N.Y. COMP. CODES R. & REGS. § 553.2 (May 28, 1985).
[12] 6 N.Y. COMP. CODES R. & REGS. § 560.5(d)(1) (proposed September 28, 2011).
[13] *Id.* § 555.5.
[14] *Id.* § 551.6.

Very precise **casing and cementing standards** and procedures are specified in the proposed regulations, and are required to be specified again within the drilling permit.[15] Intermediate casing, prior to production casing, is required, but may be waived by DEC.[16] Notification of DEC prior to the cementing of casing is required, and a log of all cementing jobs must be available to DEC at the well site during drilling operations, and thereafter at DEC request.[17] After cementing is completed, a pressure test must be conducted prior to fracturing, and actual fracturing may not exceed the amount of pressure exerted during the test.[18]

The **definition** of high volume hydraulic fracturing is any stimulation of a well using 300,000 gallons or more of water as the primary fracturing fluid.[19] **Hydraulic fracturing operations** are tightly prescribed by the proposed regulations. Backup "secondary" containers are required for all fracturing additive containers and for flow-back tank containers. A minimum of two vacuum trucks must be onsite during fracturing and flow back in the event of a spill. Pressure exerted on any equipment may not exceed 95% of the pressure rating for the weakest component. Operations must be immediately suspended if any pressure or flow condition is indicated that deviates from the approved plan; such suspension is deemed a non-routine incident which must be reported to the DEC, whose approval is needed prior to recommencing operations. **Flow-back water** may not be stored in any on-site pit, and must be contained in watertight steel tanks or in other DEC-approved material. Transfer of water to tanker trucks must be visually supervised at both intake and outtake.[20]

The DEC proposes **site design and preparation restrictions**: Unless provided for in the lease, the access road must be located as far as practical from dwellings, churches and unleased property. All equipment that comes in contact with flow-back water must be composed of materials compatible with such. Any pit used for more than one well must: be designed to divert surface and storm water away; not exceed 250,000 gallons, or exceed 500,000 gallons for multiple pits on one tract of land; have liner thickness of at least 30 mils; and have seams that are factory-installed or field-seamed according to manufacturer specs.[21]

---

[15] *Id.* § 560.6(c)(10).
[16] *Id.* § 560.6(c)(13).
[17] *Id.* § 560.6(c)(10)(x).
[18] *Id.* § 560(c)(20).
[19] *Id.* § 560.2.8.
[20] *Id.* § 560.6(c)(26).
[21] *Id.* § 560.6(a).

An **emergency response plan** must be submitted to the DEC at least three days prior to well spud, and must be prominently displayed during operations. The relevant county emergency management office (or fire department) must be notified of the location and schedule of all drilling and production activities.[22] Any non-routine incident of potential environmental and/or public safety significance must be verbally reported to the DEC within two hours of the incident's occurrence or discovery. Non-routine incidents may include, but are not limited to: casing, drill pipe or hydraulic fracturing equipment failures, fires, seepages, surface chemical spills, observed pit liner failure, complaints of water-well contamination, or anomalous pressure and/or flow conditions.[23]

The **waste management and water resource protection** rules require watertight tank storage for flow back fluids and the submission of a "Fluid Disposal Plan," showing sufficient capacity to handle the waste, including information on the planned disposal of the material.[24] This Fluid Disposal Plan includes projected concentrations of chemical constituents of the flow back, though actual constituents need not be listed.[25]

The proposed rules provide for the following **four disposal options for flow back**: 1). publicly owned treatment works (POTWs); 2). privately-owned industrial treatment facilities; 3). onsite treatment and recycling with no discharge to ground or surface waters; and 4). deep well injection.

Disposal of flow back fluid at a POTW requires that the POTW notify the DEC.[26] The DEC will then determine whether the POTW's SPDES permit needs to be modified to account for the proposed additional discharges, in accordance with New York's Clean Water Act provisions set forth in 6 NYCRR §750-2.9, 40 CFR Part 403, and 40 CFR 122.42. Only POTWs with approved industrial pretreatment or mini-pretreatment programs may accept HVHF flow-back fluid. Prior to accepting flow-back fluid, the POTW must perform a headworks analysis to confirm that such analysis meets the requirements of 40 CFR Part 403 and the SPDES permit for that facility.[27] Prior to accepting flow-back fluid, the operator must provide the POTW with the

[22] *Id.* § 560.5(a).
[23] *Id.* § 560.5(c).
[24] *Id*. § 750-3.12(a).
[25] *Id*. § 750-3.12(b).
[26] *Id*. § 750.3.12(d)(1).
[27] *Id*. § 750.3.12(d)(1)(vi).

source well of the wastewater, the identity of the permitted operator, all chemicals additives used in that hydraulic fracturing, the volume of wastewater to be discharged, and the concentration of chemicals present, including TDS, NORM and BTEX.[28] A POTW may at its discretion refuse to accept any source of HVHF wastewater, in which case the wastewater shall be sent to the contingent location previously listed on the Fluid Disposal Plan.[29] **Disposal of flow back fluid at privately-owned industrial treatment facilities** follow similar guidelines as do POTWs, with additional SPDES permit requirements.[30]

The onsite **recycling of flow back fluid,** in which treated water is 100% reused, does not require a SPDES permit.[31] The operator must comply with the methods approved under the DEC's solid waste and solid waste transporter permitting regimes under Parts 360 and 364 of DEC regulations.[32] After completion of well development, no residuals may remain at the well site.[33]

Deep well injection requires first an EPA UIC permit for Type I disposal wells, followed by the approval of an SPDES permit for deep well injection.[34] The pre-existing SPDES permit process will require the additional requirement of a full characterization of the water quality in the disposal strata; geotechnical information on the disposal strata's ability to retain the fluid, including an estimate of available capacity; and a water quality analysis of the receiving stratum for TDS, chloride, sulfate and metals.[35] The SPDES permit may require monitoring or discharge limits in order to protect overlying potable water aquifers.[36]

Proposed **water withdrawal permits** would apply to any withdrawal of 100,000 gallons or more.[37]

Drill cuttings must be disposed of in an approved solid waste facility, and may be disposed of on-site only with permission from the landowner, although oil-based mud or polymer-based mud may not be buried on-site under any circumstances.[38]

---

[28] *Id*. § 750.3.12(d)(1)(vi)(c).
[29] *Id*. § 750.3.12(d)(1)(viii).
[30] *Id*. § 750.3.12(d)(2)(iii).
[31] *Id*. § 750.3.12(d)(3).
[32] *Id*. § 750.3.12(d)(3)(i).
[33] *Id*. § 750.3.12(d)(3)(ii).
[34] *Id*. § 750.3.12(d)(4)(i).
[35] *Id*. § 750.3.12(d)(4)(ii).
[36] *Id*. § 750.3.12(d)(4)(iii).
[37] *Id*. § 601.6.

Reclamation must include the stockpile, protection, and reapplication of all removed topsoil. Well pads and access roads must be scarified or ripped to alleviate compaction, and DEC must approve of final reclamation.[39]

Proposed **air emissions** regulations in the DEC's Supplemental Generic Environmental Impact Statement outlines several specific restrictions on operators to mitigate adverse air quality impacts from HVHF operations. The EIS also outlines an air monitoring program at the regional and operations levels.[40]

[38] *Id*. § 560.7.
[39] *Id*.
[40] REVISED DRAFT SGEIS ON THE OIL, GAS AND SOLUTION MINING REGULATORY PROGRAM, § 6.5.4 (proposed September 28, 2011).

Table 1: Key Provisions of New York Proposed Regulations	
1. Drilling Permits	Permit requirements include: • Chemicals to be used • Distances to any water supplies • Water sources and volumes to be used • Drill cutting disposal plan • Reclamation and transportation plan
2. Pooling	Forced pooling and unitization, both forced and voluntary, are covered by existing state law, with no proposed changes.
3. Well Spacing	New spacing requirements are proposed, ranging from 330 feet to 1,500 feet from another unit's boundary, such lengths to be determined by depth of the pool.
4. Setbacks	As measured from the edge of the wellpad, wells may not be drilled: • Within 500 ft. of wells/aquifers • Within a 100 year floodplain • Within 2,000 ft. of public water supply • On any state land • Within 4,000 ft. of unfiltered surface water supply watershed
5. Insurance and Bonds	Required in the amount estimated to plug the well in accordance with plugging specifications. Amount may not exceed $250,000, and if more than one well drilled, total may not exceed $2,000,000.
6. Well Casing and Cementing	Precise standards specified in the regulations, with intermediate casing required. Notification required prior to cementing, with a log remaining available at all times for inspection. Pressure tests required.
7. Hydraulic Fracturing Operations Standards	• Backup containers required for flow-back and additive containers • Two vacuum trucks required on site • Maximum of 95% pressure rating • Suspension and notification of DEC required if pressure deviation • No pits allowed for flow-back • Roads must minimize disturbance • Pit liners must meet specifications • Emergency response plan required • Non-routine incidents must be reported
8. Water Management	Withdrawals require permits, and there are four tightly prescribed disposal methods guided by SPDES permitting: • POTW • Privately-owned treatment facilities • Onsite treatment and recycling • Deep well injection
9. Waste Disposal	Drill cuttings must be disposed of in approved solid waste facility, unless pits are granted approval by landowner.
10. Air Quality	Several proposed restrictions on operators to mitigate adverse air quality impacts. An air monitoring program is also proposed, at the regional and operations levels.

Ohio Regulation of Marcellus Shale Drilling

Ohio's Marcellus shale drilling is currently regulated by Ohio Revised Code Annotated Ch. 1509 and Ohio Administrative Code Ch. 1501. The following discussion encompasses some of the major issues that are normally associated with Marcellus shale drilling at the state level.

Ohio created the Division of Oil and Gas Resources Management to address all issues regarding the production of oil and gas within the state. Ohio provides for the division to be administered by a chief of the division.[41] The delegated authority includes the permitting, location, and spacing of oil and gas wells within the state.[42] The chief is mandated to adopt rules for the administration of the oil and gas chapter.[43] Furthermore, the chief is granted enforcement powers for the oil and gas chapter, normally through the issuance of orders which are maintained in a database.[44] The database aids Ohio in tracking violators and will aid the chief in denying permits for operators with outstanding violations.[45]

The **permitting process** for wells in Ohio must begin with the definition of a "well." Ohio defines a "well" as any borehole, whether drilled or bored, with the state for production, extraction, or injection of any gas or liquid mineral.[46] The definition specifically excludes potable water to be used as such, but includes natural or artificial brines and oil field waters.[47] No new wells may be drilled, reopened, deepened, plugged, or converted to another use without a permit issued by the chief.[48] The permit application process requires that information regarding the well and its operations be submitted.[49] Also, an application must be accompanied by a sworn statement that the applicant has provided notice to each property owner located within 500 feet of the well's surface location and to the municipal corporation where the well is to be located.[50]

The fee structure for permits in Ohio increases in correlation with the population surrounding the new well. A new well in a township with a population of fewer than 10,000

[41] OHIO REV. CODE ANN. § 1509.02 (West 2012).
[42] *Id*.
[43] *Id*. § 1509.03 (A).
[44] *Id*. § 1509.04–041.
[45] *Id*. § 1509.041.
[46] *Id*. § 1509.01 (A).
[47] *Id*.
[48] *Id*. § 1509.05.
[49] *See id*. § 1509.06.
[50] *Id*. § 1509 (A) (9).

must pay a fee of $500, while a well in a township with a population between 10,000 and 15,000 pays a $750 fee.[51] A $1,000 permit fee is required for a township with a population of over 15,000 or a municipal corporation regardless of population.[52] Also, any application for a permit that requires mandatory pooling must be accompanied by an additional $5,000 fee.[53]

Ohio further requires that a **plan for restoration** of the land surface disturbed by drilling operations be submitted with a new well application.[54] Specific requirements regarding the restoration plan are detailed in the statute, including a provision which allows a release of responsibility to perform any and all restoration of the disturbed area with written consent of the landowner and approval of the chief.[55] Yet the chief may deny this waiver if it would likely result in substantial damage to adjoining property, contamination of water sources, or substantial erosion and sedimentation.[56]

The issue of voluntary and mandatory **pooling** is a traditional concern of landowners within the Marcellus Shale producing states. Ohio allows the chief of the oil and gas division to adopt rules relative to minimum acreage requirements for drilling units and minimum distances for new wells to maintain relative to boundaries, drilling units, and other wells.[57] The owners of adjoining tracts in Ohio may agree to pool the tracts to form a drilling unit that conforms to all applicable distance and acreage requirements.[58] Mandatory pooling may be requested by a mineral owner if the tract of land is of insufficient size or shape to meet the requirements for drilling and the owner has been unable to voluntarily form a drilling unit.[59] The unit operation of a pool and exception tracts are covered in distinct sections and provide the remaining statutory details for Ohio pooling agreements.[60]

The location of an Ohio oil and gas well is subject to certain **spacing and setback restrictions**. These restrictions can normally be avoided with the written consent of the affected landowner; however, the chief may not approve the written consent if the deviation is within 100

[51] *Id*. § 1509.06 (G) (1)–(2).
[52] *Id*. § 1509.06 (G) (3) (a)–(b).
[53] *Id*. § 1509.06 (G) (4).
[54] *Id*. § 1509.06 (A) (10).
[55] *Id*. § 1509.72.
[56] *Id*.
[57] *Id*. 1509.24. *See* also OHIO ADMIN. CODE § 1501:9-1-04 (West 2012).
[58] *Id*. § 1509.26.
[59] *Id*. § 1509.27.
[60] *See* generally *Id*. § 1509.28; *Id*. § 1509.29.

feet of the restricted area.[61] The restrictions include that the surface location of a new well shall not be within: 150 feet of any property line not within the drilling unit, 150 feet of an occupied dwelling, 200 feet of an occupied dwelling that has become part of a unit due to mandatory pooling, or 150 feet of a property that has become part of a unit due to mandatory pooling.[62] The chief may authorize a well located inside the minimum of 100 feet if the applicant provides a written statement that by locating the wells closer it will reduce impact to the landowner or to the immediate surface environment.[63] Also, the surface location of a new well shall not be within 100 feet of another well or 50 feet of a public road or railroad track.[64] Lastly, in a related note, Ohio allows the surface location of a new well that will be drilled using directional drilling to be located on a parcel of land that is not in the drilling unit of the well.[65] A "drilling unit" is defined as the minimum acreage on which one well may be drilled.[66]

An Ohio well owner is required to obtain liability **insurance** coverage of not less than one million dollars coverage for personal injury and property damages resulting from any stage of oil and gas production.[67] However, if the well is to be located in an urbanized area, the amount of insurance coverage must be no less than three million dollars.[68] Also, an owner of any well must execute and file a surety **bond** conditioned on complying with all applicable requirements of the division.[69]

Casing and cementing requirements are aimed at keeping the injection "brines" from reaching Ohio water supplies. Brine is defined as all saline geological formation water resulting from, obtained from, or produced in connection with exploration, drilling, stimulation, production, or plugging of a well.[70] Ohio's brine management statutory section provides that no brine shall be placed in any water or surface in a way that could reasonably be anticipated to cause water used for consumption to exceed the standards of the Safe Drinking Water Act.[71] Any damage to public health or safety or the environment is to be avoided in brine management as

[61] *See id*. § 1509.021.
[62] *Id*. §1509.021 (A)–(D).
[63] *See id*. § 1509.021 (A)–(D).
[64] *Id*. § 1509.021 (I), (M).
[65] *Id*. § 1509.022.
[66] *Id*. § 1509.01 (G).
[67] *Id*. § 1509.07
[68] *Id*.
[69] *Id*.
[70] *Id*. § 1509.01 (U).
[71] *Id*. § 1509.22 (A) (1).

well.[72] This section provides basic statements regarding the mud, cuttings, and other waste substances that may result from oil and gas production, while also providing brief statements regarding containment, storage pit, and tanks for such waste.[73] The division promulgated rules regarding saltwater and enhanced recovery injection projects which provide more specifics related to this area.[74] Ohio broadens the coverage of its brine management by requiring transporters of brine to obtain a registration certificate and identification number from the oil and gas division.[75] This transporter section also requires liability insurance in an amount not less than $300,000 for property damage and $300,000 to cover personal injuries resulting from the brine.[76]

Ohio includes **hydraulic fracturing** operations under the statutory term "well stimulation," which means the process of enhancing well productivity.[77] Any well stimulation must not endanger underground sources of drinking water.[78] Particularly of interest to this paper is the required submission of the geological formation to be used as the injection zone and the composition of the liquid to be injected.[79] Also, no later than 24 hours before stimulating a well, the owner must notify an oil and gas resources inspector.[80] The stimulation must be terminated and the oil and gas division immediately notified if damage occurs to the casing or cement during the stimulation of the well.[81] The chief will then have the responsibility of determining whether the well may be completed through remedial measures, or must be plugged and abandoned due to irreparable damage.[82] The chief, in an effort to determine the casing or cement integrity, may require the owner of the well to submit cement evaluation logs, temperature surveys, pressure tests, or any combination of these.[83] Generally, Ohio mandates that no owner shall construct a well, or permit defective casing in a well to leak fluids or gases, that causes damage to other permeable strata, underground sources of drinking water, or the surface of the land or that threatens the public health and safety or environment.[84]

---

[72] *Id*. § 1509.22 (A) (2).
[73] *See id*. § 1509.22.
[74] *See* OHIO ADMIN. CODE § 1501:9-3; § 1501:9-5.
[75] OHIO REV. CODE ANN. § 1509.222 (A) (1) (West 2012).
[76] *Id*. § 1509.222 (A) (2).
[77] *Id*.
[78] *Id*. § 1509.19
[79] *Id*. § 1509.06 (A) (8).
[80] *Id*.
[81] *Id*.
[82] *Id*.
[83] *Id*.
[84] *Id*. § 1509.12 (A).

With regard to **water management**, Ohio oil and gas wells must not be located within fifty feet of a stream, river, watercourse, water well, pond, lake, or other body of water.[85] The wells must be constructed in a manner that is approved by the chief using materials that comply with industry standards for the type and depth of the well and the anticipated fluid pressures that are associated with the well.[86] Furthermore, the well must be constructed using sufficient steel or conductor casing that protects and isolates all underground sources of drinking water as defined by the Safe Drinking Water Act.[87] Each time that cementing of any casing is required, an oil and gas division inspector shall be notified.[88] Also, within 60 days after completion, an owner shall submit to the chief a copy of information validating the integrity and quality of the cementing.[89] The water interests of property owners in Ohio appear to be protected, as the state requires that an owner shall replace the water supply disrupted by the owner's oil and gas operation by physical replacement or a payment of fair market damages for the loss to the property holder.[90] Lastly, if construction of a well site impacts wetlands, streams or other waters of Ohio, the operator must get a Section 401 permit pursuant to the Clean Water Act and a Section 404 permit from the U.S. Army Corps of Engineers to authorize the impacts.[91] The general permit approach should be both responsive to water concerns, while also allowing for the efficient processing of permits for the industry.[92]

Recently, the Ohio Department of Natural Resources closed the comment period on more stringent rules for certain types of **waste disposal**. The draft rules can be found at the Department's website.[93] Drill cuttings managed on the drill site are regulated by the Ohio Department of Natural Resources.[94] Those drill cuttings coming into contact with drilling mud, oils or other sources of contaminants that are sent off-site for disposal are classified as solid

[85] *Id*. § 1509.021 (L).
[86] *Id*. § 1509.17 (A).
[87] *Id*.
[88] *Id*. § 1509.17 (C).
[89] *Id*.
[90] *Id*. § 1509.22 (F).
[91] OHIO EPA, DRAFT GENERAL PERMIT FOR SHALE GAS EXPLORATION SURFACE WATER IMPACTS FACT SHEET (December 2011), http://www.epa.ohio.gov/LinkClick.aspx?fileticket=II_clMQeDlU%3d&tabid=5024
[92] *Id*.
[93] OHIO DNR, DRAFT OIL AND GAS WELL CONSTRUCTION RULES, February 8, 2012, http://www.ohiodnr.com/portals/11/oil/pdf/draft_well_const_rules_10-28-11.pdf
[94] Ohio EPA, Dill Cuttings from Oil and Gas Exploration in the Marcellus and Utica Shale Regions of Ohio Fact Sheet (February 2012), *available at* http://www.epa.ohio.gov/LinkClick.aspx?fileticket=cmfCggUBals%3d&tabid=5024

waste under Ohio EPA regulations.[95] Cuttings sent off-site for disposal in Ohio must be sent to a licensed solid waste landfill.[96] In addition, the Ohio DNR recently researched and announced new standards for the transporting and disposing of hydraulic fracturing brine.[97] The standards were a response to seismic activity in the Youngstown area and include: prohibition of drilling into Precambrian basement rock formation; mandatory submission of geological data before drilling; mandatory shut-off switches and data recorders; and required updates for pressure and volume monitoring.[98] Furthermore, a "cradle to grave" monitoring system for brine haulers will be implemented as well.[99]

Air quality issues are being addressed by the Ohio Environmental Protection Agency through the issuance of general permits. The draft general permit covers a variety of emissions sources found at most shale gas well sites, including internal combustion engines, generators, dehydration systems, storage tanks, and flares. The draft permit contains emissions limits, operating restrictions, and monitoring, testing and reporting requirements. General permitting allows all the terms and conditions to be developed in advance.[100] A potential applicant reviews the general qualifying criteria and then applies if required by the criteria.[101] The Ohio EPA notes that the main goal behind the program is to increase the timeliness of permit issuance.[102] With the detailed analysis the Ohio EPA hopes to issue these general permits for Marcellus producers in a matter of weeks.[103]

[95] *Id*.
[96] *Id*.
[97] OHIO DNR, *Ohio's New Rules for Brine Disposal Among Nation's Toughest* (March 9, 2012), *available at* http://www.ohiodnr.com/home_page/NewsReleases/tabid/18276/EntryId/2711/Ohios-New-Rules-for-Brine-Disposal-Among-Nations-Toughest.aspx
[98] *Id*.
[99] *Id*.
[100] OHIO EPA, AIR GENERAL PERMIT FOR SHALE GAS WELL SITES FACT SHEET (February 2012), *available at* http://www.epa.ohio.gov/portals/47/nr/2012/february/airgp2-1-12.pdf
[101] *Id*.
[102] *Id*.
[103] *Id*.

Table 2: Key Provisions of Ohio Regulation	
1. Drilling Permits	No new wells unless operator obtains a permit. Notice of application must be provided to property owners/ municipalities within 500 feet of the well's surface location. Fee structure increases in correlation with population surrounding the well.
2. Pooling	Voluntary pooling is allowed if the agreement conforms to certain requirements. Mandatory pooling may be requested if land is insufficient size or owner is unable to voluntarily pool.
3. Well Spacing	The surface location of a new well shall not be within 100 feet to another well.
4. Setbacks	A new well shall not be within: • 100 feet of restricted area • 50 feet to a public road or railroad track • 150 feet to occupied dwelling • 200 feet to occupied dwelling and 150 feet to property subject to mandatory pooling
5. Insurance and Bonds	Liability insurance of not less than 1 million dollars. If in urban area, not less than 3 million dollars. A surety bond must be executed and filed in order to comply with division requirements.
6. Well Casing and Cementing	Division Chief may shut down well if defective casing is found. Evaluation logs, surveys, and test may be required for the cementing used at wells.
7. Hydraulic Fracturing Operations Standards	Fluids used must not endanger ground water. The geologic formation and fluid composition used must be submitted to division.
8. Water Management	No wells shall be located within 50 feet of stream, river, etc. U.S. Clean Water Act 401 permits are required if impact to wetlands, streams, etc. Water disrupted shall be restored or the landowner appropriately compensated.
9. Waste Disposal	Department recently promulgated more stringent rules for waste disposal and the draft rules are available at Dept. website. The Dept. handles on site waste disposal. Ohio EPA handles off site waste disposal.
10. Air Quality	General Permitting conducted by Ohio EPA in order to grant speedy review of Marcellus well permits.

Pennsylvania Regulation of Marcellus Shale Drilling

Pennsylvania recently passed an extensive revision of its Oil & Gas Act (58 PA. STAT. ANN. §§ 601.101–601.607) and now specifically addresses concerns with natural gas drilling and hydraulic fracturing. The law became effective after its signing on February 14, 2012. The new law will be codified at 58 PA. CON. STAT. §§ 3201–3274. Also, the Environmental Quality Board's oil and gas well regulations were modified in February 2011. While the Act and the regulations supplement one another, the Act's modification will require changes to 25 PA. CODE Ch.78 & 79 in order to maintain consistency. The relevant laws and regulations are administered by the Pennsylvania Department of Environmental Protection ("DEP"). The Environmental Quality Board is delegated the authority to adopt and implement regulations for the respective oil and gas Acts.[104]

Oil and gas companies must obtain a **permit** from the DEP before drilling a well in Pennsylvania.[105] The permit must be kept on-site during the conducted drilling activities.[106] Fees may be charged by the DEP and normally shall issue a permit within 45 days from the submission with possibility for a 15-day delay.[107] A host of other requirements are required for permit issuance and renewal; however, most of the regulations remain unchanged after the recent changes. One change is that the scope of landowners and purveyors requiring notification was greatly expanded. After the code revision, Marcellus well operators are required to send notice of permit application to landowners and water purveyors within 3000 feet of the well bore.[108] In addition to the notice change, written comments by municipalities in which a Marcellus well is located and gas storage operations within 3000 feet of the proposed well bore may now be considered by DEP.[109] Pennsylvania's new legislation authorizes counties where unconventional gas wells are located to institute a fee for those wells.[110] The fees must operate inside the bounds of some very specific guidelines included in the new Act.[111] The original Act allowed for permit

[104] 58 PA. STAT. ANN. § 601.604.
[105] *See id*. § 601.201
[106] *Id*.
[107] *Id*.
[108] 58 PA. CONS. STAT. § 3211(b)(2).
[109] *Id*. § 3212.1; *Id*. § 3215(d).
[110] *Id*. § 2302
[111] *See id*. § 2302

objections by surface owners when subjected to surface disruption from the mineral interest owner.[112]

The **pooling ("integration") and unitization** of natural gas interests was not significantly modified by the recent changes in Pennsylvania law. When a spacing unit contains multiple parcels of separately-owned real estate, the owners may voluntarily "integrate" their parcels for natural gas development purposes.[113] If an agreement is not reached voluntarily, operators having an interest in the spacing unit will normally request an integration order from DEP.[114] The standard for issuing an integration order depends on whether "just and reasonable" terms and conditions are provided.[115] DEP will conduct a public hearing and notify the parties interested in the integration order before approval takes place.[116] Unitization agreements between oil and gas interest owners are not contrary to law in Pennsylvania and will be regarded as valid.[117]

The recent code overhaul in Pennsylvania strengthened requirements for well **setbacks**. The vertical well bore shall not be within 500 feet of buildings and water wells.[118] Also, the vertical well bore shall not be within 1000 feet of a water supply used by a purveyor.[119] Furthermore, streams, springs, wetlands and other bodies of water are protected by two separate requirements: well bores shall not be within 300 feet and the edge of the well site shall not be within 100 feet of these water sources.[120] Variances and waivers from these setback requirements are available on a case-by-case basis, but compliance with other areas of the Act must be shown.[121] There are also some prohibitions regarding the location of items that normally accompany a natural gas drilling site. No wastewater pit or impoundment may be located in the 100 year floodplain,[122] while tanks containing hazardous materials, chemicals, or waste are prohibited in Pennsylvania floodways.[123]

---

[112] 58 PA. STAT. ANN. § 601.202.
[113] 58 PA. STAT. ANN. § 408.
[114] *Id*.
[115] *Id*.
[116] *Id*.
[117] *Id*. § 409.
[118] 58 PA. CON. STAT. § 3215.
[119] *Id*.
[120] *Id*.
[121] *Id*. § 3215 (a).
[122] *Id*. § 3215 (f).
[123] *Id*.

The **spacing** between one natural gas well and another natural gas well were previously addressed in Pennsylvania by well spacing orders.[124] The DEP is authorized to establish welling spacing and drilling units for each pool of natural gas.[125] The process for authorizing a spacing order is intricate and provided in the statute.[126] Specifically, the DEP will consider the following factors when establishing spacing orders and size of units: surface topography and property lines, other well spacing plans, production depth, characteristics of the producing formation, the efficient and economical drainage for a well, and scientific data for the gas pool.[127] Pennsylvania appears to prefer a case-by-case determination with regard to spacing issues, instead of a predetermined distance for well spacing.

Bonding requirements for wells are increased by the new Pennsylvania language. Under the original Act, after submitting a permit application, the well operator must file a bond with DEP.[128] The Bond liability will continue until the well is plugged in the proper manner.[129]The bond amount varies according to the well bore length and the number of wells operated. If the well bore is less than 6,000 feet, and the number of wells operated is less than 50, then the bond amount is $4,000 per well.[130] Once the number of wells operated exceeds 50, there is a lump sum (ranging from $35,000 to $100,000) required in addition to the individual well amount.[131] The same conditions apply to well bores of 6,000 feet or more, except that a $10,000 per well bond is required and lump sums are required once the number of wells operated exceeds 25 (ranging from $140,000 to $430,000).[132] It is important to note that there are maximum bond amounts provided in the statute for the differing bond levels.[133]

Casing for wells in Pennsylvania is addressed by the original Act and regulations regarding waste prevention. Casing is required for production that drills through fresh water strata.[134] The purpose is to prevent gas and other fluids from contaminating the groundwater.[135]

---

[124] *See* 58 PA. STAT. ANN. § 407.
[125] *Id*.
[126] *Id*.
[127] *Id*.
[128] 58 PA. STAT. ANN. § 601.215
[129] 58 PA. CON. STAT. § 3215(f).
[130] *Id*. § 3225.
[131] *Id*.
[132] *Id*.
[133] *Id*.
[134] 58 PA. STAT. ANN. § 601.207.
[135] *Id*.

Also, drilling through a coal seam will give rise to casing requirements.[136] The production casing shall be cemented in place with a sufficient amount of cement to fill the annular space to at least 500 feet above the casing shoe and at least 200 feet above the highest perforations.[137] The cement should be allowed to set to at least a compression strength of 500 pounds per square inch and use generally recognized industry engineering data.[138] The waiting time on the cement must be at least 8 hours.[139]

The chemical disclosure for **hydraulic fracturing** fluids is often mentioned with regard to Marcellus shale drilling operations. Pennsylvania now makes the disclosure of the fluids mandatory through disclosure forms and an online registry.[140] The statute specifies that the chemical registry will be publicly available at FracFocus.com.[141] Also, the law now addresses industry concerns over trade secrets and proprietary information claims and how those claims will be handled in Pennsylvania.[142] For example, a well operator will not be mandated to disclose chemical components of fracturing fluids if the manufacturer or provider does not disclose them.[143] Furthermore, the new language requires a maximum concentration, in percent by mass, of each chemical intentionally used for fracturing operations.[144]

The high volume of **water** required for Marcellus shale drilling and the possible risks associated with the processes are subject to some new mandates. Any kind of withdrawal or use of water for hydraulic fracturing will now require a DEP approved **water management** plan.[145] Some river basin commissions approve the plans already and the DEP will presume these to qualify under the new language, but reserve the right to add requirements if necessary.[146] However, the Ohio River Basin water management plans will be managed solely by the DEP.[147] With regard to water contamination, any pollution to water supplies within 2,500 feet of a vertical well bore and 12 months from the well's completion, drilling, or stimulation result in

---

[136] *Id*.
[137] 25 PA. CODE § 79.12.
[138] *Id*.
[139] *Id*.
[140] 58 PA. CON .STAT. § 3222.1
[141] *Id*.
[142] *See id*.
[143] *Id*. § 3222.1(c)(1).
[144] *Id*. § 3222(b.1)(1).
[145] *Id*. § 3211(m).
[146] *Id*.
[147] *Id*.

presumed responsibility.[148] A pre-drill test can be performed by the drilling operator to use in a later rebuttal, and if the local landowner refuses to permit the pre-drill test, the presumption of liability will not apply.[149]

The issue of **public access** to information is addressed by the establishment of a contamination hotline, mandatory notification to public drinking water facilities that may be affected, and publication of confirmed contamination from hydraulic fracturing.[150] If a well operator pollutes or diminishes a water supply, the operator must either restore or replace the water supply.

Also, **well site restoration** is addressed by the original Oil & Gas Act in Pennsylvania. The owner/operator of a well must restore the surface estate for disturbances caused by the drilling operation.[151] During the course of the site's operations, an erosion and sediment plan must be followed.[152] Once drilling is complete, nine months are normally allowed for site restoration and the restoration should be performed pursuant to Pennsylvania's Clean Streams Law.[153]

The **waste disposal** procedures are important to all parties operating or living in the Marcellus shale region. Pennsylvania now requires the submission and development of a containment plan for well drilling sites.[154] Also, the DEP is now authorized, if it so chooses, to create special measures for hazardous substance storage within 750 feet of any stream, spring, and other waters.[155] In addition, well operators using hydraulic fracturing are now required to maintain five years of wastewater transport records (including volume of fluids, the transporter of the wastewater fluids, the disposal and transport location for fluids, and the method of disposal).[156] The DEP hopes to ensure that any facility seeking an NPDES permit for wastewater from drilling activities utilizes a competent and qualified individual.[157]

---

[148] *Id*. § 3218(c).
[149] 58 PA. STAT. ANN. § 601.208.
[150] 58 PA. CON. STAT. § 3218(b.2) & (b.3); *Id.* § 3218.1; *Id*. § 3218(b.4).
[151] *See* 58 PA. STAT. ANN. § 601.206.
[152] *Id*.
[153] *Id*.
[154] 58 PA. CON. STAT. § 3218.2
[155] *Id*. § 3215(d.1).
[156] *Id*. § 3218.3.
[157] *Id*. § 3218(b.5).

The possible **air quality issues** that are associated with increased natural gas drilling in Pennsylvania are discussed by a recent DEP fact sheet.[158] The U.S. Environmental Protection Agency requires a report of total statewide air pollutant emissions every three years.[159] In December, 2011 the DEP notified operators and owners of natural gas operations that, pursuant to federal law, the department would collect air emissions data.[160] The scope of information required by this assessment is quite extensive. Owner/operators download spreadsheets to online DEP systems for reporting.[161] Emissions data and source reports must be reported for stationary engines, drilling rigs, tanks/impoundments, and a variety of site sources.[162] Specific contaminant information requested includes, for example: carbon monoxide, oxides of nitrogen, sulfur dioxide, volatile organic compounds, and particulate matter of varying sizes.[163] Furthermore, the DEP recently (March 3, 2012) proposed a revised General Plan Approval and/or Operating Permit for natural gas facilities that establish emission limitations and other applicable Federal and State requirements including Best Available Technology requirements.[164]

[158] FACT SHEET: AIR EMISSIONS INVENTORY FOR THE NATURAL GAS INDUSTRY, Pennsylvania Department of Environmental Protection, *available at* http://www.depweb.state.pa.us/portal/server.pt/community/oil_and_gas/6003.
[159] *Id*.
[160] *Id*.
[161] *Id*.
[162] *Id*.
[163] *Id*.
[164] PA BULLETIN NOTICE, PROPOSED GENERAL PLAN APPROVAL AND/OR GENERAL OPERATING PERMIT FOR NATURAL GAS PRODUCTION AND/OR PROCESSING FACILITIES, Pennsylvania Department of Environmental Protection (March 3, 2012), *available at* http://www.dep.state.pa.us/dep/deputate/airwaste/aq/default.htm.

Table 3: Key Provisions of Pennsylvania Regulations	
1. Drilling Permits	No wells shall be drilled without a permit. Notice of permit application must be provided to landowners, water purveyors, and gas storage operations within 3000 feet of the well bore.
2. Pooling	Voluntary integration is allowed in Pennsylvania. Operators may request an integration order, but the DEP must provide adequate notice to parties and conduct public hearings.
3. Well Spacing	Well spacing is handled by the DEP through the issuance of spacing orders. The DEP takes multiple factors into account when reviewing the requested spacing order.
4. Setbacks	A new vertical well bore shall not be within: • 500 feet of buildings or water wells • 1,000 feet of water sources used by purveyors • 300 feet from streams, springs, wetlands, and other water bodies.
5. Insurance and Bonds	Bonds are increased in accordance with length of the well bore and the number of wells. The maximum bonds range from $35,000 to $600,000.
6. Well Casing and Cementing	Required when drilling through water strata or coal seam. Cement must set at 500 lbs of pressure per square inch. Also, must set for minimum of 8 hours.
7. Hydraulic Fracturing Operations Standards	Disclosure of fluids and composition required through forms and online registry. A safe harbor is present for operators that receive fluids from manufacturer claiming trade secret/ proprietary privilege.
8. Water Management	Water management plans are now required for well sites. Rebuttable presumption of contamination responsibility if with 2500 feet of well bore and within 12 months of well's completion.
9. Waste Disposal	Containment plans are now required for well sites. Record keeping requirements for fracturing waste must be maintained for 5 years.
10. Air Quality	Emissions data is currently being collected in compliance with federal law. Recent revisions to Plan Approval and General permitting for natural gas facilities.

West Virginia Regulation of Marcellus Shale Drilling

West Virginia's Marcellus shale drilling is now regulated by W. Va. Code, § 22-6A, the Horizontal Well Control Act, passed in December 2011. The legislation is guided by a broad policy finding that accounts for the unique benefits and burdens particular to Marcellus shale gas extraction.[165] Accordingly, the **authority delegated** to the WV Department of Environmental Protection (DEP) grants broad discretion to the Secretary condition the grant of permits, as well as to waive permit requirements (subject to the requirement that the Secretary supply to the Legislature the number of waivers granted each year).[166] Such discretion is reflected by the use of "may" in several sections of the statute in describing the Secretary's obligations to enforce the provisions of the Act.[167]

Permit applications must include an erosion control plan certified by a registered engineer; a construction plan certified by a registered engineer; and a site safety plan. Associated fees are $10,000 for the initial well drilled at the site, and $5,000 for each additional well drilled on that same well pad.[168]

Qualifications for **new DEP inspectors** (which apply to all oil and gas well inspectors) require at least two years of relevant work in the oil and gas industry, with no more than one of those years being satisfied by relevant bachelor degree education or other environmental work. Salaries are set at no less than $35,000, and not less than $40,000 for supervisors.[169] The new permit fees are expected to enable the Office of Oil and Gas to hire 18 new inspectors, in addition to the current 19 inspectors.[170]

Notice must be given to property owners prior to entry for surveying, along with additional information regarding erosion and sediment control requirements; notice of and copies of permit applications must be provided to owners as well.[171] **Public notice** is required for each

[165] W. VA. CODE ANN. § 22-6A-2 (West 2012).
[166] *Id.* § 22-6A-2(a)(6).
[167] *Id*. § 22-6A-7(j).
[168] *Id.* § 22-6A-7.
[169] *Id*. § 22-6-2a.
[170] Metro News (Aug. 8, 2010), http://www.wvmetronews.com/news.cfm?func=displayfullstory& storyid=47021.
[171] *Id*. § 22-6A-16(b).

permit application, followed by a 30-day public written comment period.[172] The Secretary is required to establish a comprehensive public website with searchable listings and locations of all well permits, applicants, and public comments. Persons must also be able to receive electronic alerts of any permit applications or actions, as specified by county of interest.[173]

The **definition of Marcellus shale drilling** regulated under the Act specifies horizontal wells which disturb three or more acres of surface, excluding pipelines and roads, or utilizes more than 210,000 gallons of water in any 30-day period. Any existing or pending horizontal well permits are grandfathered in, and the Act does not apply to vertical Marcellus shale wells.[174]

Pooling and unitization rules apply as before, and differ as to whether the well is a deep or shallow well: "shallow well" is one drilled no deeper than one hundred feet below the top of the Onondaga Group, while "deep well" refers to a well drilled to a formation below the top of the uppermost member of the Onondaga Group.[175] Voluntary pooling and unitization is allowed for all wells, and deep wells can be force pooled by the Oil and Gas Conservation Commission based upon pre-existing statute.[176]

Spacing requirements also apply according to the separate rules governing shallow and deep wells.[177] Shallow wells have no spacing requirements (unless there is an objection from a coal operator), while deep well spacing requirements are 3,000 feet from another well location and 400 feet from a lease or unit boundary.[178]

The **well location restrictions and setbacks require** that wells may not be drilled within 250 feet from any existing water well or domestic spring used for human or domestic animal consumption, or within 625 feet of an occupied dwelling or large cattle or chicken shelter (as measured from the center of the well pad). The secretary may grant a variance to these two limitations, subject to submission of an appropriate plan by the operator, and subject to terms and conditions. No well pad may be placed within 100 feet of any perennial stream, lake, pond or wetland, within 300 feet of a naturally reproducing trout stream, or within 1,000 feet of a surface

[172] *Id*. § 22-6A-10.
[173] W. VA. CODE ANN. § 22-6A-21.
[174] *Id*. § 22-6A-2.
[175] *Id*. § 22C-9-2.
[176] *Id*. § 22C-9-7.
[177] W. VA. CODE R. § 39-1-4.2.
[178] *Id*. § 39-1-4.

or ground water intake of a public water supply (as measured from the center of the well pad). These setback requirements do not apply to pipelines or well roads.[179]

Contamination of water from a source or supply within 1,500 feet of the center of the well pad creates a rebuttable presumption that the contamination was caused by the drilling operation. The operator can rebut that presumption by proving by a preponderance of evidence that either: the pollution existed prior to drilling; the operator was not permitted to test the water before drilling; the pollution occurred six months after completion of drilling activities; or there was some other cause of the pollution. To preserve these defenses, the operator must retain the services of an independent certified lab to conduct a predrilling water test. Unless waived by owner, water supply replacement must be provided by the operator at the Secretary's discretion.[180] All drinking water wells within 1,500 feet of an operator's water supply well must be flow and quality tested by the operator, upon request of the owner prior to operating the water supply well.[181]

A **performance bond** is required in the amount of $50,000 for each well drilled; if an operator plans for more than one well, a blanket performance bond of $250,000 is available to cover all wells. [182]

Minimum **casing and cementing standards** are provided by the statute, which authorizes the DEP to promulgate additional standards. The statute requires operators to prepare "casing programs" for each well that details the specifications of the casing to be used, in accordance with rules promulgated by the DEP secretary. Any defects in casing, or migration of natural gas from the casing, require prompt notification of the secretary.[183]

Hydraulic fracturing operation standards are specified at the permitting stage, with each permit requiring the operator "at a minimum" to: remediate the area disturbed (that is not required in the production of the well) where necessary to bind the soil and prevent "substantial" erosion and sedimentation; follow "industry standards" to minimize "conditions which constitute a hazard to health and safety of the public"; prevent, "to the extent possible using the best management practices," contributions of suspended or dissolved solids to streamflow or runoff

[179] W. VA. CODE ANN. § 22-6A-12.
[180] *Id*. § 22-6A-18.
[181] *Id*. § 22-6A-8(g)(5)(D).
[182] *Id*. § 22-6A-15.
[183] *Id*. § 22-6A-24.

outside the permitted area, with no contribution in excess of requirements already set by applicable law; and utilize "casing, sealing or otherwise managing wells to keep returned fluids from entering ground and surface waters."[184] More specific requirements or standards are not provided by the statute.

If the water withdrawals for the well require more than 210,000 gallons, a **water management plan** must be included in the permit. While water withdrawal permits are not required, the operating permit application must indicate: the location of the water source and anticipated schedule and volume of withdrawals; the water disposal plan; and a list of anticipated and actual additives included in the frack water. If any surface water is withdrawn in WV, a water management plan must: indicate any public intakes within a mile of the withdrawal; ensure the maintenance of adequate in-stream flow; and the methods used to minimize adverse impact to aquatic life.[185] Operators may not withdraw water at volumes "beyond which the waters can sustain."[186] The operator must record and retain for three years for requested inspection by the department the following records: the quantity of flow-back water and produced water; the method of disposal of said water; the quantity of water transported; and the collection and disposal locations of water.[187]

Water disposal methods are not addressed by this recent legislation. However, the Secretary prohibited any further land application of any flow-back fluids from Marcellus shale drilling. Recycling, reuse and UIC are the expressly permitted and acceptable disposal methods under DEP permit GP-WV-1-88

Drill cuttings and drill mud must be disposed of in an approved solid waste facility, and may not be disposed of on-site without express permission of the landowner, in a manner approved of by the secretary.[188]

The Secretary of the DEP is required to **further study**, within a year, the generation of **noise, light, dust and volatile organic compounds** as they relate to occupied dwellings in proximity of drilling operations.[189] Within 18 months, the Secretary is required to further study

[184] *Id*. § 22-6A-8(g)(5).
[185] *Id*. § 22-6A-7.
[186] *Id*. § 22-6A-8(g)(5)(A).
[187] *Id*. § 22-6A-8(i).
[188] *Id*. § 22-6A-8(g)(2).
[189] *Id*. § 22-6A-12.

air pollution issues associated with drilling, including possible health impacts, and to promulgate legislative rules if necessary.[190] Within two years, the Secretary must study **impoundment and pit safety** to evaluate the necessity of testing and further regulation of radioactivity or toxins is necessary.[191]

[190] *Id*. § 22-6A-22.
[191] *Id*. § 22-6A-23.

Table 4: Key Provisions of West Virginia Regulation	
1. Drilling Permits	Each application must include: • Certified erosion control plan • Certified construction plan • Site safety plan • $10,000 fee for initial well and $5,000 for each additional well at that pad.
2. Pooling	Pooling and unitization rules apply as before: • Shallow well rules apply to 100 feet into Onondaga group and above, and deep wells below • Voluntary pooling/unitization allowed for all wells • Deep wells can be force pooled by Commission under existing statute.
3. Well Spacing	No spacing requirements for shallow wells. Deep well spacing requirements are 3,000 feet from another well and 400 feet from a lease/unit boundary.
4. Setbacks	As measured from the center of the well pad, no well may be drilled within: • 625 feet of an occupied dwelling. • 100 feet of a stream, pond, or wetland • 300 feet of a trout stream • 1,000 feet of surface/ground public water supply intake
5. Insurance and Bonds	Performance bond required in amount of $50,000 for each well drilled, with a $250,000 bond available to cover all wells drilled.
6. Well Casing and Cementing	"Casing programs" are required for each well used, in accordance with the basic guidelines. The secretary may promulgate additional standards. Any defects/migration require prompt notification of the secretary.
7. Hydraulic Fracturing Operations Standards	Operator is required at a minimum to: • Remediate area disturbed • Follow industry standards to minimize hazards • Prevent runoff • Keep returned fluids from entering ground and surface waters.
8. Water Management	Water management plan required, which requires no permit, but must indicate: • Location and volume of withdrawal • Water disposal plan • List of anticipated additives Water disposal methods are not addressed by the statute, but the secretary has disallowed land application of flow-back fluid.
9. Waste Disposal	Drill cuttings and mud must be disposed of in an approved solid waste facility, unless permission is granted by the landowner to dispose of in onsite pits.
10. Air Quality	The secretary must study air quality issues, including possible health impacts, within 18 months of the law's passage, and to promulgate rules if necessary.

Conclusion

As the preceding materials make clear, state laws are "catching up" to the actual business of extracting Marcellus shale gas, with each state responding to that opportunity in distinct ways. While New York, for example, has undergone an exhaustive and lengthy public notice and comment process to arrive at extensively expanded rules, Ohio has relied largely upon preexisting gas statutes, responding to Marcellus-specific issues as they arise. While West Virginia's new statute defers several issues and standards to the state's DEP for further study, Pennsylvania greatly expanded its preexisting gas statute and rules for comprehensive coverage of Marcellus-related issues. Given the proximity of these Marcellus States and the already-considerable drilling activity and planning across the entire region, the environmental and economic effectiveness of each state's regulatory regime will soon provide a unique comparison of differing approaches to environmental regulation.

Moreover, as is perhaps not surprising given the volatile history of gas development in the U.S., the sense of certainty granted by these state regimes is by no means final. With both federal and state studies of Marcellus gas extraction still pending, particularly in regard to water issues, the business of extracting shale gas is yet still subject to a shifting regulatory landscape. For better or for worse, that ever-shifting landscape is nothing new in a field as inherently dynamic as energy law.