Chapter 13

Thinking Horizontally in a Vertical World:
Practical Considerations for Practitioners Advising
Clients on Horizontal Development
in the Marcellus and Big Sandy Fields

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Synopsis

§ 13.01. Introduction .................................................................................. 418
§ 13.02. Drilling Horizontal Wells .................................................................. 418
[2] — Geology Primer on the Marcellus
and Big Sandy Fields ........................................................................ 421
[3] — Horizontal Drilling Technology in the Basin ................................ 422
§ 13.03. Basic Property Laws in the Appalachian Basin.............................. 424
[1] — Rule of Capture ........................................................................ 424
[3] — Apportionment and Non-Apportionment ..................................... 426
§ 13.04. Drilling Regulations in the Appalachian Basin............................ 428
[1] — West Virginia ............................................................................... 429
[2] — Virginia ....................................................................................... 431
§ 13.05. Lease Considerations .................................................................... 432
[1] — Pooling and Unitization ............................................................... 433
[2] — Calculation and Payment of Royalties ........................................ 433
§ 13.06. Trespass ......................................................................................... 434
[1] — Subterranean Trespass ............................................................... 435
[2] — Surface Trespass ......................................................................... 436
§ 13.07. Implied Covenants ....................................................................... 437
[1] — Duty to Develop ........................................................................ 438
[2] — Duty to Protect ........................................................................... 441
§ 13.08. Horizontal Development Concerns ............................................... 443
§ 13.09. Conclusion ................................................................................... 445
§ 13.01.  Introduction.

In 1991, Rex Burford and John H. Johnston authored *Legal and Developmental Issues Involving Horizontal Drilling in the Appalachian Basin* to “encourage discussion about horizontal drilling and the developing body of law emerging from this rapidly advancing technology.”\(^1\) At the time of publication, horizontal drilling was a rapidly advancing technology in the western part of the United States, but only a few test wells had been drilled in the eastern United States.

After nearly 18 years, horizontal drilling is beginning to take hold in the Appalachian Basin (Basin). Last year, 459 horizontal wells were permitted in West Virginia and Kentucky alone.\(^2\) The vast majority of these wells were drilled in the Huron Shale, but the technology has also been applied to the development of the Marcellus Shale and coalbed methane.\(^3\) Although Mr. Burford’s chapter may have seemed far-reaching at the time of publication, today it is applicable. While technology has advanced, the oil and gas regulations discussed in his chapter have not.

As we will discuss further, the current oil and gas statutes, case law, and real property laws that exist in the Appalachian Basin do not always provide adequate guidance for the legal questions that arise when drilling horizontal wells. This chapter is intended to help practitioners think horizontally within the current framework of laws and leases based on conventional vertical drilling technology. As such, it is essential for all practitioners to have a basic understanding of the geology and technology associated with horizontal drilling, as well as a firm understanding of the property laws in the state within which their client operates.

§ 13.02.  Drilling Horizontal Wells.

[1] — Why Drill Horizontally?

Due to the recent increase in the use of horizontal drilling in the Appalachian Basin, it is worthwhile to understand why there has been such an

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2. Phone conversation with Kentucky Division of Oil and Gas Conservation and West Virginia Division of Oil and Gas on May 10, 2009.
3. Horizontal drilling is being used increasingly in the development of coalbed methane gas; however, for the purposes of this chapter we have limited our discussion to the production of natural gas.
increase, why it is likely to continue, and some advantages and disadvantages of drilling horizontally in the Basin.

Until recently, development of shale plays have been largely ignored by large exploration and production (E&P) companies due to a low rate of return on the initial capital expenditure of drilling vertical shale wells.\textsuperscript{4} Vertical shale wells average 50 to 100 thousand cubic feet of gas production steadily over a 20 to 30 year period.\textsuperscript{5} However, with horizontal technology, the expectations are for increased recovery upfront, which would allow for a quicker recovery of drilling costs. As with any business, the prospect of increased profits and quicker recovery of initial development costs is an attractive formula for success.

However, there are several disadvantages to drilling horizontally:

1. \textit{Cost}. The cost of drilling a horizontal well can run anywhere from one million to six million dollars. Clearly, as this technology advances in the Basin and becomes more readily accepted, these costs can be expected to decrease. The increase in drilling costs is directly related to the technologies and tools required to drill horizontally.\textsuperscript{6}

2. \textit{Technology}. As will be discussed in Section 13.02[3], horizontal drilling requires additional technology, tools, expertise, and specialized rigs in order to drill a well bore vertically and then create a curve to finish the well horizontally.

3. \textit{Leases}. In the Appalachian Basin in particular, there are surviving leases from the early 1900s. These leases often do not allow for the consolidation of lease properties (pooling or unitization) making it difficult for producers to put together sufficient acreage positions to drill horizontal wells.\textsuperscript{7}

4. \textit{Laws}. Due to the lack of widespread development since the early 1900s, there have been very few laws enacted in the eastern United States modifying the rule of capture. The right to drill on one’s land without retribution is deeply imbedded within the Basin and will

\textsuperscript{5} \textit{Id.}
\textsuperscript{6} See infra § 13.02[3].
\textsuperscript{7} See infra § 13.05.
be the greatest hurdle to widespread development of horizontal drilling.\textsuperscript{8}

For each disadvantage discussed above there is an advantage for the Appalachian Basin to embrace horizontal drilling:

1. \textit{Terrain.} The vast majority of oil and gas producing shale in the eastern United States is located in the Appalachian Mountain Range making it difficult to locate acceptable well locations due to the overall terrain of the region. Horizontal wells, which can be 3,000 to 5,000 feet in length, allow development of these otherwise undeveloped areas.

2. \textit{Coal.} In much of the Appalachian Basin, gas fields and coal fields often overlap. These overlaps lead to disputes. Horizontal drilling, although not eliminating the need to drill through mineable coal seams, allows drainage of a greater area with fewer penetrations through the coal seams.

3. \textit{Production.} Due to the length of a horizontal well bore there is a potential for a greater drainage area, faster recovery of the gas within that drainage area, and overall improved well performance.\textsuperscript{9}

4. \textit{Surface Disturbance.} The overall acreage required to drill a horizontal well is nearly double that of a vertical well.\textsuperscript{10} However, multiple wells can be drilled on one location, decreasing the amount of overall surface disturbance that would be required to drain an area through vertical drilling.\textsuperscript{11}

\textsuperscript{8} See infra § 13.04.

\textsuperscript{9} Producing gas from multiple wells in the same field reduces the pressure in the formation that is needed to move the gas to the well. Thus, it is believed that by drilling fewer wells at greater distances apart, this effect will be reduced.

\textsuperscript{10} Horizontal wells drilled into the Marcellus formation may require additional acreage to store water allowing for mud or water drilling and fracturing processes. See infra § 13.02[3].

\textsuperscript{11} Since production from a horizontal well does not occur in the vertical section of the well, multiple wells can be drilled from the same pad. The vertical sections of the well can be within 10 to 35 feet of each other while maintaining adequate spacing between the producing zones of the wells. See infra § 13.02[3].
2] — Geology Primer on the Marcellus and Big Sandy Fields.

The two primary formations currently being targeted with horizontal drilling in the Appalachian Basin are the Lower Huron and Marcellus shale formations. The Marcellus and Lower Huron are both Devonian shales and as such are expected to be highly organic formations that have low permeability and are highly fractured.

The Lower Huron is located in the Big Sandy Field running from eastern Kentucky up through southern West Virginia and lies approximately 3000 to 5000 feet beneath the surface. It is an under-pressured formation meaning it produces gas at low pressure (30-50 psig). This gas does not move well through the highly fractured formation.

The Marcellus formation or field exists throughout most of the Appalachian Basin; however, most exploration and production companies are targeting the portion of the field running from New York to the middle of West Virginia. In this section of the field, the formation tends to be thicker and lies approximately 6,000 to 8,000 feet beneath the surface abutting the Onondaga formation. In contrast to the Lower Huron, the Marcellus formation is an over-pressured formation, meaning the gas is under extreme pressure and can produce at pressures upwards of 250 psig.

Horizontal drilling is an effective tool for producing natural gas found in the highly fractured formations commonly found in the Basin. “In naturally fractured reservoirs, the overburden and in situ stresses in the reservoir often cause vertical fractures to be preferentially aligned in one direction. As a result, horizontal wells have the opportunity to intersect multiple fracture sets when drilled perpendicular to the plane of preferential fracturing.”

Think of a lined piece of paper laying flat on your desk as the rock formation containing gas reserves; each line on the paper is a natural fracture in the rock and your pencil is the well bore. When you drill a vertical well, the pencil tip touches only one line on the paper; assuming we do not create additional fractures there will be limited opportunities to drain gas from the entire reservoir. But if the well is drilled horizontally, the pencil will lie

across multiple lines on the paper; thereby creating the potential for more gas production by intersecting multiple lines on the paper. So from a geological perspective, horizontal drilling makes perfect sense. It allows producers to make contact with more of the gas-bearing reservoir by intersecting more natural fractures within the targeted rock formation and hopefully, produce more gas than conventional drilling methods.


The technology involved with drilling a horizontal well is best left to the engineers that have mastered this technology. For our purposes, there are a few essential pieces of the technology that will aid a lawyer in understanding and advising a client of the legal issues that may arise from horizontal drilling.

First and foremost, it is essential that your client employ a drilling company with horizontal drilling experience. Currently, there are significant differences in the rigs and tools used to drill vertical and horizontal wells. Additionally, there will be significant differences in drilling technology based on the depth of the formation being produced. Air drilling, which is common practice in the Appalachian Basin, can be used to drill horizontal wells in shallow formations such as the Lower Huron. However, due to the increase in formation pressures, it may be necessary to use water or mud in the drilling process to prevent formation collapse or blow-outs.\(^{13}\)

The vertical section of a horizontal well will be drilled in the same fashion as a vertical well until the drill bit gets to the “kick-off point.” The kick-off point is the point at which the drilling will begin deviating from vertical to horizontal. The drilling crew will begin using different tools than those required to drill the vertical section of the well.

Once the kick-off point is reached the drilling team will begin drilling the “curve.” The curve is the portion of the well that allows the driller to change the direction of the well from vertical to horizontal. Depending on the degree of the curve, it can take upwards of 750 feet to transition from vertical to horizontal. The curve must be drilled in a specific direction, commonly called the “azimuth.” The azimuth will be dictated by the geology

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in the drilling area and a geologist usually determines the azimuth prior to drilling. The azimuth is determined to ensure the well will intersect multiple fractures and hopefully, increase the amount of gas produced. Thinking back to the pencil example, the goal was for the pencil to cross the lines, not lie in between the lines. The same is true for a horizontal well.

At this point, the rig crew will begin using additional tools to enable them to drill the curve and the horizontal well bore. These tools include a downhole motor and a measurement while drilling (MWD) instrument. The downhole motor is the device that allows the well to be drilled at an angle turning it from vertical to horizontal. The downhole motor can be adjusted to increase or decrease the angle at which the curve is drilled. The downhole motor is connected to drill bit and allows the drill bit to rotate independently of the drill string. For example:

Think of your arm as the drill assembly. If you placed your arm down a vertical hole and then bent your elbow as you applied weight to your arm you would impart a sideways force at your hand in the bottom of the hole.  

The drill bit is turned to the appropriate azimuth and drilling can begin again. These devices will continue to be used throughout the remainder of the drilling process. The angle of drilling and the speed of the drill bit may increase or decrease to maintain the drilling angle. The rotation of the bit will negate the angle, thereby allowing the driller to maintain a desired angle.

While drilling the curve (build section) and the horizontal (lateral section) of the well the driller will monitor the drilling progress by using a MWD. The MWD “transmits a sonic signal up the hole, through the drilling fluid, to a readout device at the surface.” From a legal perspective this is the most crucial instrument used for drilling a horizontal well. For example, if the azimuth of a well is not maintained, your client’s well could divert from a 45-degree azimuth to a 50-degree azimuth and cross an adjacent lease line. If the length of the later section is not monitored, your client’s well could result in production on an unleased tract. Finally, if your client

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14 *Doing the Lateral Lambada*, § 16.03[2][b].
15 Van Dyke, supra note 13 at 137.
has limited production rights, such as rights to produce from the surface to the Onondaga, and the depth and angle of the well are not monitored, the horizontal well could enter the Onondaga and produce from an unleased formation. Given the widespread use of horizontal drilling technology in the United States and the advances with MWD instruments, there may be little excuse for subterranean trespasses.

§ 13.03. Basic Property Laws in the Appalachian Basin.


The rule of capture is historically important in oil and gas law. Although the rule of capture has been modified by state conservation statutes, portions of the rule of capture still apply, to one extent or another, in the eastern states. Thus, a brief discussion of the rule of capture and its relevance to horizontal drilling is included in this chapter.

The rule of capture originally referred to the capture of wild animals, not to the capture of minerals. At issue in Pierson v. Post,16 the seminal rule of capture case, was to whom a dead fox belonged: to the hunter who pursued the animal with hounds or to the farmer who killed and carried off the fox. The court ruled that ownership of ferae naturae is not acquired until the animal is reduced to possession or captured.17

It is an ancient rule of property that “cujus est solum, ejus est usque ad coelum et ad inferos.”18 Or, he who owns the soil owns upward unto the sky and to the depths. In the case of hard minerals, the owner of the land overlying the minerals clearly owns the minerals. Oil and gas are not contained within property boundaries, thus a different theory of ownership was needed.

In Westmoreland & Cambria Natural Gas Company v. DeWitt,19 the rule of capture was applied to oil and gas. In this case the court described oil and gas as ferae naturae,20 recognizing that oil and gas could move from one property to another. The court noted that because of the fugitive nature

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16 Pierson v. Post, 3 Cai. R. 175 (N.Y. 1805).
17 Id. at 179.
18 2 William Blackstone, Commentaries *18.
20 Id. at 725. See also Brown v. Vandergrift, 80 Pa. 142 (1875) where the nature of oil and gas, as understood at the time, are discussed.
of oil and gas, production of oil or gas from any surface area reduced the entire pool of oil and gas.

They [oil and gas] belong to the owner of the land, and are a part of it as long as they are on it or in it, and are subject to his control; but when they escape, and go into another’s land, or come under another’s control, the title of the former owner is gone. The possession of the land, therefore, is not necessarily possession of the gas. If an adjoining owner, or even a distant owner, drills his own land and taps your gas, so that it comes into his well and under his control, it is no longer your, but his.21

The rule of capture is often considered more of a non-liability rule than a theory of ownership in that it provides a property owner the right to search for and produce oil and gas from the owner’s property without liability for draining minerals that are under another’s property.22 State conservation statutes have been enacted in most states to supersede the common law rule of capture.23 Additionally, it is now understood that oil and gas do not “wander” from property to property. Nevertheless, the rule of capture has played an important role in oil and gas law and is still important in many jurisdictions, most notably West Virginia.24


Correlative rights is a legal theory limiting the application of the rule of capture. This theory recognizes the opportunity of each owner of land making up part of a common pool of oil and gas to produce an equitable share of such products.25 In a case of first impression, the Texas Supreme Court recognized correlative rights as limiting the rule of capture in Elliff v. Texon Drilling Co.26 In deciding that a landowner could maintain a suit

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21 Westmoreland, 18A at 249.
23 See infra § 13.04. Conservation statutes were enacted to prevent over drilling and waste.
25 Ohio Oil Co. v. State of Ind., 177 U.S. 190 (1900).
26 Elliff v. Texon Drilling Co., 210 S.W.2d 558, 562 (Tex. 1948).
for negligence and waste against a producer drilling on an adjoining tract the court stated:

The term ‘correlative rights’ is merely a convenient method of indicating that each owner of land in a common source of supply of oil and gas has legal privileges as against other owners of land therein to take oil or gas therefrom by lawful operations conducted on his owner land; that each such owner has duties to the other owners not to exercise his privileges of taking so as to injure the common source of supply; and that each such owner has rights that other owners not exercise their privileges of taking so as to injure the common source of supply.27

The majority of the eastern United States has resisted codifying changes to the rule of capture and merely implemented spacing requirements to curtail over-development as discussed in Section 13.04. The western portion of the United States has fully adopted and applied this legal theory to their regulation of oil and gas development.


Another common law rule that is likely to arise in horizontal drilling is the apportionment rule. The issue of apportionment arises where leasehold ownership is subsequently divided. For example, Party A leases a 100-acre tract to Party B and subsequently conveys 50 acres of the 100 acre tract to Party C without reserving the oil and gas. If Party B proceeds to drill a well on the 50 acres that Party C owns, who is entitled to the royalty from that well? Is the royalty apportioned between parties A and B or is the rule of capture strictly applied and Party C receives all of the royalty?

This situation first arose in the Pennsylvania case of Wettengel v. Gormley.28 In Wettengel, a lessor entered into an oil and gas lease encompassing three separate tracts of land. Subsequently, the lessor devised a tract to each of his children in his will. The lessee produced oil from one

27 Id. at 582-583, citing 1 W. L. Summers, The Law of Oil and Gas § 63 (perm. ed. 1954).
tract and one devisee claimed all of the royalty. The court held that because of the non-divisibility of the leasehold the owners of the subdivided tracts were each entitled to a share in royalty, regardless of where the well was located, thereby creating the rule of apportionment.

Initially, the West Virginia Supreme Court of Appeals adopted the apportionment rule in *Lynch v. Davis.* However, this ruling was limited by *Pridemore v. Lucas.* In *Pridemore,* the court distinguished very clearly between the case where a lease is signed and subsequently the leasehold is subdivided and where the owners of several tracts enter into one lease. In the first instance, there will be no apportionment of the royalty and the rule of capture will be strictly enforced. In the latter instance, because the parties to the lease have voluntarily entered into an agreement essentially consolidating their oil and gas interests, the royalty will be divided proportionately between the lessors.

In *Robinson v. Milam,* the West Virginia Supreme Court of Appeals reasoned that although royalties were not subject to apportionment, rents paid in lieu of development or delay rentals should be apportioned between the owners of the divided leasehold. In so holding, the court distinguished delay rentals from royalties. Royalties are a return paid on the minerals reduced to possession taken from the leasehold, and delay rentals or rents in lieu of further development are moneys paid as part of the lease agreement. Thus, rents are subject to apportionment.

Kentucky also follows the non-apportionment rule. In *Hurst v. Paken Oil Company,* the court rejected the holding in *Wettengel* and instead held:

[w]here an oil and gas lease is made by one party to another, covering one or more tracts of land, and is made to extend to the heirs and assigns of the parties, and different parties by purchase become the

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31 *Id.*
32 *Id.* at 843.
34 *Id.* quoting Dickson v. Mapes, 73 P.2d 1131, 1132 (Okla. 1937).
35 *Robinson* at 239–40.
36 Hurst v. Paken Oil Co., 152 S.W.2d 981 (Ky. 1941).
owners of separate portions of the one tract or to separate tracts of
the whole, as the case may be, each owner is entitled to the oil and
gas produced on his tract and to the royalties or rentals arising from
the oil and gas produced by the wells located on such tract, provided,
there is no reservation of the mineral rights in the deed. It follows as a
necessary corollary that the owner of the individual tract has no right
to the royalties or rents accruing under the lease by reason of gas or
oil being extracted from wells not situate on his property. 37

While the apportionment rule is easily applied in the case of vertical
drilling, horizontal wells raise additional questions. In the example above, the
vertical well was clearly on either the 50 acres that belonged to Party A or the
50 acres that belonged to Party C. A horizontal well may cross portions of
both sections of the leasehold. Should Party A and Party C share equally in
the royalty from the leasehold since each owns half? In a state that adheres
to the apportionment rule, that is the outcome. In a non-apportionment state,
it is likely that under the rule of capture Party A would receive the royalty
from the gas produced from Party A’s portion of the leasehold and Party C
would receive the royalty from the gas produced from Party C’s portion of
the leasehold. Additionally, must all of the owners of a divided leasehold
modify the lease in order for the lessee to pool a portion of the leasehold
with an adjacent lease? These issues will be discussed in more depth in the
Section 13.05 of this chapter.


The current drilling regulations in the Basin provide little guidance
when drilling horizontal wells. In fact, the majority of the statutes fail to
define or recognize the potential of drilling horizontally. For the purposes of
demonstrating the diverse nature of the oil and gas laws in the Appalachian
Basin, we will compare West Virginia’s oil and gas conservation statutes to
the Virginia Gas and Oil Act of 1982 (“the Act”).

West Virginia’s statutes have placed few limitations to the rule of
capture, while Virginia has fully embraced the theory of correlative rights.
It is worth mentioning that most eastern oil and gas statutes lie somewhere

37 Id. at 983.
in between these two extremes. The statutes recognize the need to prevent waste and over drainage by prescribing spacing regulations and then provide assistance with meeting the required spacing by allowing force pooling, in certain instances.\[38\]

**[1] — West Virginia.**

West Virginia’s force pooling statutes are very limited.\[39\] Most significantly, the West Virginia oil and gas conservation statutes\[40\] do not apply to shallow wells, but only apply to deep wells.\[41\] Nevertheless, an operator can make use of the conservation statutes by permitting the well to be drilled more than 20 feet into the Onondaga Group even though the well targets the Marcellus.\[42\] Because the oil and gas conservation statutes in West Virginia are so limited they will only be discussed briefly in this chapter.

According to the statutes, after a discovery deep well is drilled, the operator of the well or any operator affected by the deep well may file an application with the Oil and Gas Conservation Commission (“Commission”) to establish drilling units.\[43\] After all interested parties are notified of the application, the Commission determines the field that would be covered by the spacing order and the acreage and shape of each drilling unit contained therein.\[44\] The Commission holds a hearing only if a noticed party requests a hearing.\[45\]

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41. Shallow Wells are defined as “any well drilled and completed in a formation above the top of the uppermost member of the Onondaga Group: Provided, that in drilling a shallow well the operator may penetrate into the Onondaga Group to a reasonable depth, not in excess of twenty feet, in order to allow for logging and completion operations, but in event may the Onondaga Group formation be otherwise produced, perforated or stimulated in any manner.” *Id.* at § 22C-9-2(a)(11).

42. The Onondaga formation is the formation beneath the Marcellus Shale.


44. *Id.* at § 22C-9-7(a)(2).

45. *Id.*
After the Commission establishes drilling units within a field, owners of interests in the same drilling unit may voluntarily pool their interests. However, the code also provides for forced pooling of interests as well. Any operator with an interest within a drilling unit may request a Commission hearing regarding the unit. Again, all interested parties must receive notice of the hearing. At the hearing, the Commission shall enter an order pooling the interests within the unit and the sharing of the production from the unit.

The order shall provide for the manner that owners of operating interests in the pool may participate in the well. The order will also include “just and reasonable” terms for the integration of the various royalty interests in the unit. “Just and equitable share of production” is defined in the statute as “an amount of oil or gas or both substantially equal to the amount of recoverable oil and gas in that part of a pool underlying such person’s tract or tracts.”

It is notable that the West Virginia Conservation statute provides a special provision for the surface owner in the case of deep wells. In order to drill a deep well, the operator must obtain an easement for the drilling of the well from all owners of the surface tract upon which the deep well is located. This effectively gives the surface owner final say over the development of the minerals underlying the surface despite any language to the contrary in the severance deed.

In addition to the Oil and Gas Conservation statutes, West Virginia law allows an operator whose drilling permit has been refused by the Shallow Gas Well Review Board to apply for the establishment of a drilling unit. In West Virginia, in order for an operator to receive a permit to drill a well the operator must provide notice to the coal owners and lessees where the well would penetrate any workable coal seam. In the event a coal owner objects to the location of a well and the shallow well review board refuses

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47 Id.
48 Id. at § 22C-9-7(b)(3).
49 Id. at § 22C-9-7(a)(10).
50 Id. at § 22C-9-2(a)(16).
51 Id. at § 22C-9-7(b)(4).
52 Id. at § 22C-2(4).
a drilling permit based upon this objection, the gas operator may apply for
the shallow well review board to establish a drilling unit encompassing
contiguous tracts.\(^{53}\)

If the pool of gas that would be drained by the well that was not permitted
could be drained from another tract, and there are no objections from the
owners of the coal seams on that tract, the operator may establish a drilling
unit and drill a well to drain the gas from any part of the drilling unit, whether
it is under lease or not.\(^{54}\) Even if the royalty owners and gas operators on
the contiguous tracts do not agree to the establishment of the drilling unit,
the shallow well review board may still establish the unit.\(^{55}\)

[2]—Virginia.

The Virginia Gas and Oil Act transitioned Virginia from a common law
rule of capture state to a legislated correlative rights state.\(^{56}\) The Act created
a board to administer the provisions of the new statute. The Board of Gas
and Oil ("the Board") was empowered to "administer procedures for the
recognition and protection of the rights of gas or oil owners with interests
in gas or oil resources contained within a pool."\(^{57}\) The Board was further
empowered to "protect correlative rights."\(^{58}\)

The Act implemented a statewide spacing requirement of 1,250 feet
between each well completed in the same pool; however, the Board may
create fields with different spacing requirements, and allow exceptions to
the statewide or field specific spacing requirements.\(^{59}\)

Producers are required to pool all parties within a unit. Therefore the
legislature provided voluntary and forced pooling provisions to help achieve
the goal of protecting correlative rights.\(^{60}\) The calculation of royalties for

\(^{53}\) Id. at § 22C-8-9(a).
\(^{54}\) Id.
\(^{55}\) Id. at § 22C-8-10(b).
\(^{57}\) Id. § 45.1-361.15(A)(3).
\(^{58}\) Id. § 45.1-361.15(B)(2).
\(^{59}\) Id. at §§ 45.1-361.17 and §§ 361.20(D). As in other coal producing states, the Act
provides coal operators the opportunity to object to the location of the well and have the
objections heard by an impartial board.
\(^{60}\) Id. § 45.1-361.21(2009).
those parties force-pooled is currently prescribed by regulations promulgated by the Board. The royalty is paid proportionately to the acreage each tract contributes to the unit. Currently, the Board has set field specific spacing requirements for the “Berea Field” and the “Roaring Fork Field.” Although these field rules were implemented mainly to encourage coalbed methane development, the field rules have also been applied to horizontal test wells.\textsuperscript{61}

For those producers operating in Virginia, the Act does not address horizontal drilling in any explicit terms. However, by empowering the Board to enact field rules and allow for exceptions through an administrative hearing, Virginia is armed with regulations that will allow for widespread development and continue to protect the correlative rights of all lessors.

\section*{§ 13.05. Lease Considerations.}

Oil and gas have been produced from the Appalachian Basin for nearly 150 years. Many leases in effect today date from the early days of development in the Basin as a result of the secondary term (commonly known as the “so long as” clause) typical in oil and gas leases. Relative to oil and gas development, horizontal drilling is very new. The parties to these old leases would, without a doubt, be amazed with the recent technological developments in drilling. These old leases need to be analyzed to make sure that they will support the type of drilling planned on a tract. Often, an operator’s analysis of whether a well can be drilled legally begins and ends with whether the tract on which the well is located is under lease or not. This is an insufficient analysis for vertical and horizontal drilling.

First, the lease and any modifications to the lease must be examined carefully for any limitations to where wells could be drilled under the lease. The lease may not allow the operator to drill within so many feet of the dwelling house, croplands, coal tipples, etc. Additionally, in states where it is necessary to create units in order to comply with spacing regulations,

\footnote{\textsuperscript{61} The Board authorized square units of 60 acres in the Berea Field and 80 acres in the Roaring Fork Field for coalbed methane wells drilled in those fields. Vertical wells within these two fields are regulated by the statewide spacing rules. In 2008, the Board approved the drilling of horizontal test wells by combining four units (two units wide by two units high) creating a provisional horizontal unit of 320 acres in the Roaring Fork Field.}
leases may limit all surface development while allowing the tract to be pooled for production purposes.

Second, any assignment or sublease of leasehold rights to third parties will restrict an operator’s rights to the leasehold. It is typical for older leases in the Basin to have had multiple owners. One of these owners may have assigned or farmed out the rights to drill certain depths or acreage around specific wells. Therefore, it is essential that all documents affecting the operator’s rights to the leasehold be examined carefully before drilling. A lessee may need a new lease or a lease modification to develop the leasehold.


Language in a lease allowing for the pooling of the lease acreage is important in horizontal drilling. Horizontal wells, with laterals in excess of 3,000 feet, may stretch across multiple leases. To drill from one lease to another and produce gas from multiple leases will require a drilling unit or pooling agreement. Drilling units are nothing new and many leases grant the lessee the ability to pool or consolidate leases into drilling units. If a lease does not allow the lessee to form drilling units, the lessee will need to modify the lease or reach an agreement with the lessors to form a separate unit for each well. Modifying the lease can pose a challenge where leasehold ownership is divided between perhaps hundreds of heirs. Lessors may demand additional consideration commensurate with what is being offered for new leases in the area.


When an operator creates drilling units or pools, there are several ways to calculate royalty. Historically, in the case of smaller leaseholds, operators have often formed consolidation pools or units, combining two or more leases, drilling one well, and paying the royalty in proportion to the acreage each lease contributes to the consolidated area. On large leaseholds, lessees often formed drilling units around wells drilled near lease boundaries and split the royalty between the two lessors. This would allow the lessee to develop the lease boundaries without triggering a requirement to drill an offsetting well on the adjacent lease. These units are often eighty acre squares or circles around the well.

62 Leases may contain explicit terms requiring offset wells. See also infra § 13.07[2], for a discussion of the implied duty to protect from drainage.
With horizontal wells, there is the option of forming an elliptical unit around the well bore and paying royalty based upon the percentage that each lease contributes to the total acreage of the unit. If a well is drilled across two consolidated leaseholds, one 100 acres and the second containing 200 acres, and 70 percent of the well is located on the 100 acre tract, the lessor of the 200 acre lease will receive twice as much royalty as the lessor of the 100 acre lease for any well drilled on the leases. If, on the other hand, an elliptical unit is built around the wellbore, the royalty will be paid more equitably because the 100-acre tract would contribute more acreage to the unit. Under the first scenario it is likely that the lessor of the 100-acre tract will complain he is receiving a disproportionate share of the royalty.

When forming units, it is advisable to restrict the unit to the formation that the well produces. Otherwise, future development of other formations will be complicated by the existing unit.

§ 13.06. Trespass.

Trespass is the unlawful entry on another person’s real property. As discussed in Rule of Capture, he who owns the soil owns upward unto the sky and to the depths. Thus, trespass may be committed on, beneath, or above the surface of the earth. It is very easy to tell if a vertical well trespasses onto the property of another because of the location of the wellhead. While directional drilling creates the possibility of a subsurface trespass from an adjacent property, horizontal drilling makes it possible to trespass into the subsurface from a surface location thousands of feet away. A driller must exercise care not to trespass when drilling a horizontal well.

The case law is well settled that trespassers fall into two categories, intentional trespassers and innocent trespassers. If a mineral trespass is willful, the damages will be value of the minerals either at the mine pit in the case of coal or the wellhead in the case of oil and gas. In the event the

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64  2 William Blackstone, Commentaries *18.
65  Restatement (Second) of Torts § 159(1)(1965).
67  Pan Coal Co. v. Garland Pocahontas Coal Co., 125 S.E. 226, 228 (W. Va. 1924).
trespass was innocent, the damages will be the same, less the costs of mining or drilling.\textsuperscript{68} An innocent trespasser is, therefore, no worse off than if there had been no trespass. The willful trespasser, on the other hand, has lost his costs associated with the production of the minerals. Thus, in a trespass case, the innocence of the trespass will be at issue. In this analysis, recklessness is considered willfulness.\textsuperscript{69}

\textbf{[1] — Subterranean Trespass.}

Horizontal drilling creates additional possibilities for subterranean trespass. A subterranean trespass is likely to occur one of two ways, either the well deviates from its intended path onto an adverse tract, or the lessee has failed to acquire all rights necessary to drill the well. With the precision available in drilling today, it is likely that any significant departure from the planned path of the horizontal well bore runs the risk of a being a reckless trespass. An operator should make sure that the contract driller understands the importance of conforming to the planned well bore path. A slight change in the azimuth of a well or drilling the lateral section of the well a few more feet could be disastrous.

In the case of a vertical well, to guard against a trespass an operator will only need to ensure that he has the right to drill on the tract where the well is located. In the case of a horizontal well, a producer must have the right to drill under each tract through which the well passes. Thus, the legal title to the oil and gas for each tract through which a well passes should be examined. Whether or not an operator complied with common industry practices such as researching the title to a tract before drilling may be considered evidence of good faith in a trespass case.

Horizontal drilling makes it possible to drill under roads and railways and this creates a unique possibility for trespass. If a well passes beneath a road or railway the ownership of the minerals beneath the road or railway must also be addressed. If a road or railway was constructed pursuant to a surface easement, the road or railway will not impact the mineral ownership. Some road and railway grants, however, are fee simple grants to either the

\textsuperscript{68} *Id.* See also Bryan v. Big Two Mile, 577 S.E.2d 258, 270 (W. Va. 2001).

\textsuperscript{69} *Pan Coal* at 125 S.E. at 231.
railroad or state agency. The granting language in the deed will determine what rights were conveyed.

If the road or railroad was built pursuant to a condemnation proceeding, the condemnation statutes in effect at the time of the condemnation will need to be examined. Two West Virginia cases highlight the importance of this. In *Hays v. Walnut Creek Oil Company*, a railroad included property it had obtained through a condemnation proceeding in an oil and gas lease. The court considered the condemnation statute in effect at the time of condemnation, reviewed a Virginia case considering the identical statute, and held that the railroad company owned the strip of land condemned in fee. More recently, in *Signaigo v. Norfolk & Western Railroad Company*, the West Virginia Supreme Court of Appeals applied the statute in effect at the time of the condemnation and held that the railroad owned a fee simple interest in the strip of land. These cases highlight that railroads often own a fee simple interest in the lands under railroad tracks.


Although the chance of subterranean trespass increases with horizontal drilling, the possibility of surface trespass must also be kept in mind. The relationship between the oil and gas operator, oil and gas owner, and surface owner will depend upon the language in the severance deed and lease. Either the severance deed or the lease may contain explicit limitations to the oil and gas operator’s rights to the surface and must be read carefully. While the rights necessary to enjoy the mineral estate will be implied in the mineral severance, these implied rights will not supersede the explicit terms of the severance deed or lease.

Typical use of the surface that may result in a trespass in horizontal drilling includes the construction of pits, laying of temporary water lines,

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70  *Hays v. Walnut Creek Oil Co.*, 75 W. Va. 263 (1914).
72  *Roanoke City v. Berkowitz*, 80 Va. 616 (1885).
73  *Hays*, 83 S.E. at 268.
75  W. Va. Code § 42-18 (1923). It is worth noting that this statute grants a railroad a fee simple interest but in the case of a turnpike or other road only a right of way.
76  *See Buffalo Mining Co. v. Martin*, 267 S.E.2d 721 (W. Va.1980).
or laying of well lines. Unless the granting deed or lease says otherwise, the surface of one tract may not be burdened with the development of the minerals underlying another tract. ⁷⁷ The best practice is to obtain a surface easement from the surface owner if the surface use will support wells that drain multiple leaseholds.

§ 13.07. Implied Covenants.

Courts have long recognized that oil and gas leases, although contractual in nature, may not “expressly address matters pertaining to the development and protection of the lessor’s interest.” ⁷⁸ Accordingly, the courts began filling in those gaps with implied covenants. ⁷⁹ The most commonly applied covenants include (1) implied covenant to develop the lease, (2) implied covenant to protect the lease from drainage, (3) implied covenant to market, and (4) implied covenant to conduct operations with reasonable care. ⁸⁰

With the renewed interest in leasing and developing shale formations within the Appalachian Basin, many oil and gas owners are being approached by would-be lessees who are making extraordinary offers in exchange for the right to drill. Many of these oil and gas owners are currently leased but receive only minimal royalties. ⁸¹ With the prospect of large up-front payments and a ⅛th royalty, lessors are starting to look for ways to get out

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⁷⁷ See Wiser Oil Co. v. Conley, 346 S.W.2d 718 (Ky. 1960), Ross Coal Co. v. Cole, 249 F.2d 600 (4th Cir. 1957).
⁷⁹ See Stoddard v. Emery 18 A. 339 (Pa. 1889), one of the first cases in the eastern United States to recognize the need for implied covenants. There has been significant debate about whether implied covenants are implied by fact or by law.

Generally, whether covenants are implied in fact or implied in law makes little practical difference. However, if the latter, they do not constitute part of the contract itself and an action brought on an implied covenant may be governed by the statute of limitations for a cause of action not arising in contract. If the former, they are considered as part of the contract and are subject to the same laws . . . as the written lease. Treating implied covenants the same as express covenants for these purposes makes common sense, which, perhaps more than any scholarly debate, explains why courts favor the implied-in-fact approach. Anderson, supra note 78 at 402.

⁸⁰ Anderson, supra note 78 at 402.
⁸¹ Many of the early 1900s leases provide for a minimum royalty of $0.10 per mcf or a flat rate royalty of $1.00 to $100.00 per month.
of their old leases. As such, it is not difficult to imagine current shale plays giving rise to claims for reasonable development. Two covenants that are of particular concern to producers in the Basin are the implied covenant to reasonably develop the lease and the implied covenant to protect the lease from drainage.


The implied covenant to develop the leasehold recognizes the primary function of the lessee to operate the lease to the “mutual advantage of the parties.” This covenant can include the requirements to drill an initial well and to drill additional development wells. In either instance, the lessor must make a demand for a well and then provide a reasonable period of time for the lessee to take action.

Once a well is located upon a leased tract and production is obtained, an obligation may arise for the lessee to continue to reasonably develop the property with due diligence. However, not every circumstance of production will give rise to a claim for additional development. Lack of production from an initial well and lease provisions limiting or explicitly delineating development may negate the implied duty to reasonably develop. The key inquiry is what a “reasonably prudent operator” would do in like

82 Top-leasing has become a major problem in the Marcellus field. Lessees should conduct a title search and a field review before entering into leases in known production areas to prevent top-leasing. In West Virginia, top-lessees run the risk of being sued for slander of title. See generally, TXO Prod. Corp. v. Alliance Resources Corp., 419 S.E.2d 870 (W. Va. 1992).

83 Oil and Gas Law, Eugene O. Kuntz, 278, note 2. (West 1986).

84 It is unlikely to have an initial development issue under current oil and gas leases since they normally contain a delay rental clause. This clause provides for a specified payment in lieu of commencing drilling operations. In such cases, the delay rental expressly negates the requirement to drill and will normally hinder the court from imposing the implied covenant to develop. See, e.g., Northup Prop, Inc. v. Chesapeake Appalachia, L.L.C., 2009 WL 1576506 (6th Cir. 2009), 567 F.3d 767 (6th Cir. 2009).

85 The implied covenant to develop is often intertwined with the implied covenant to protect, since development is the most common way to protect from drainage. Infra § 13.07[2].


87 See, e.g., Sapp v. Massey, 358 S.W.2d 490 (Ky. 1962).
circumstances. In *Rush v. King Oil Co.*,\(^8\) the court stated the covenant as follows:

> Under the implied covenant of reasonable development when oil in paying quantities becomes apparent and the number of wells to be drilled on the lease is not specified, there is an implied obligation for the lessee to continue development by drilling as many wells as reasonably necessary to secure the oil for the common good of the lessor . . . .

Whether a lessee has performed the duties imposed by these implied covenants is a question of fact. The extent of the duties required of a lessee is measured by what is referred to as “the prudent operator test.” Under the prudent operator test the lessee must continue reasonable development of the leased premises to secure oil for the common advantage of both lessor and lessee and may be expected and required to that which an operator of ordinary prudence would do to develop and protect the interest of the parties.\(^8\)

The majority of states place the burden of proof in such cases on the lessor.\(^9\) The lessor must prove: (1) that additional development would have been profitable to the lessee, and (2) that the lessee failed to act as a prudent operator would under the same circumstance.\(^9\)

As noted above, mere production from the lease will not give rise to the implied duty to develop. Rather, the courts will defer “to the judgment of the operator, when, and where, and how many wells he shall drill” since he alone bears the cost of drilling and the risk of dry holes.\(^9\) It is for the lessor to prove that additional wells would have produced in quantities sufficient for the lessee to recover his drilling costs and operating expense.

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8\(^9\) *Id.* at 435.
9\(^9\) *Id.*
9\(^9\) Jennings v. S. Carbon Co., 80 S.E. 368, 370 (W. Va. 1913) [hereinafter cited as Jennings].
and a reasonable profit. Very few cases fully developed the standard by which this element will be judged. But we may infer from a reading of the case law that production on adjoining leases and other companies offering to lease and develop the property may be adequate proof.

The second element a lessor must prove is failure of the lessee to act as a prudent operator. This is the more difficult of the two elements to prove. The standard applied is commonly referred to as the “prudent operator standard.” “The reasonable prudent operator standard was originally formulated to make it clear that a lessee’s obligation is less than that of a fiduciary, but more than an obligation to act in good faith.” This standard is applied on a case-by-case basis making it difficult to determine what will persuade the court. However, the lessee will automatically be given deference by the court in making business decisions on the development of the lease. As noted earlier, the lessee bears the cost and risk of drilling a dry hole. Additionally, if a well produces even a minimal amount of gas the lessor profits since he takes the royalty free of drilling expenses. The items generally offered as proof include: whether the operator has acted in good-faith, has diligently pursued development, has an interest in adjoining properties that were developed, the technology available at the time and conservation statutes that may have limited the producer’s ability to develop.

Upon a finding of fault, the normal procedure is to allow the lessee a reasonably amount of time to begin development on the property or award damages. Forfeiture is generally reserved for the most egregious offenders. In Todd v. Manufacturers’ Light & Heat Co., the court recognized these principals by stating:

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93 Hemingway, 407-408.
94 “On the other hand, except perhaps in Louisiana, the mere willingness of another operator to engage in further drilling is not sufficient, by itself, to satisfy the lessor’s burden of proof since this other operator may not be reasonable and prudent.” Anderson, 410.
95 Lowe, supra note 90, at 310.
96 Jennings, 80 S.E. at 372 (finding the lessee acted fraudulently by not developing the lessor’s lands).
97 Waseco Chem. & Supply Co. v. Bayou State Oil Corp., 374 So. 2d 656 (La. 1979), holding in favor of the lessee and cancelling the lease due to lessee’s failure to use secondary recovery methods to develop the lease.
Ordinarily, the remedy for breach of the implied covenant relied upon [implied covenant to develop], is an action at law for damages, and there is no right in equity to have partial cancellation of the lease. *Citations omitted.* If there is such right in equity, the bill, therefore, must make out an extraordinary case.\(^9^9\)

The current boom of the Marcellus play appears to be proving that the Appalachian Basin does have vast amounts of gas reserves if the proper technology is applied. As such, the implied duty to develop could play a significant part in the further development of the Basin. As Mr. Burford wrote some 18 years ago:

> The ability of horizontal wells to increase production and reserves holds the potential to set a new standard for the covenant of reasonable development. Many areas of Appalachia contain known areas of production and dwindling reserves. The potential for a horizontal well to make these older areas economically feasible once again is not difficult to imagine.\(^1^0^0\)

**[2] — Duty to Protect.**

The duty to protect a lease from drainage obligates the lessee to drill a well in order to protect its lease from “substantial drainage,” whether in the primary term or after development has occurred. This is because the lessor confers exclusive development rights on the lessee and can not act on its own to prevent drainage.\(^1^0^1\) Where states have enacted spacing requirements no significant drainage should occur; and compliance with spacing requirements may be proffered as a defense to such claims. However, where spacing regulations fail to specifically recognize horizontal drilling as a distinct technology, it is likely one could maintain a suit.

Similar to the duty to develop, a lessor carries the burden of proof. The lessor must show substantial drainage\(^1^0^2\) from the leased premises has or is likely to occur and that an offset well would likely be profitable.

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99 Todd, 110 S.E. at 448.
100 Burford and Johnson, *supra* note 1, § 21.04.
"The requirement of substantial drainage prevents a lessor from harassing the lessee by seeking development under the guise of complaining about drainage."

Profitability is generally established by proving the profitability of wells on adjacent tracts of land. These elements are fairly easily met and current technology will allow lessors and lessees alike to offer proof of drainage patterns. The real concern to producers is that the claims are often intermingled with claims of fraud when the producer owns the well causing the drainage to occur. In these instances, it will be critical for the lessee to show that they acted in good-faith when dealing with the parties.

Two cases in West Virginia demonstrate this issue well: *Croston v. Emax Oil Co.* and *Jennings v. Southern Carbon Co.* In *Croston*, Emax drilled a well within 40 feet of the appellants’ property. At the time Emax drilled the well, it had a valid lease with the appellant that allowed Emax to pool the appellant’s acreage with other acreage. Emax attempted to negotiate a new lease with Croston after the lease was drilled to ensure the free gas clauses for both properties being pooled contained similar language. The Crostons refused to execute the new lease and in accordance with the terms of the lease Emax surrendered the lease and subsequently put the well into production. The appellants made two claims, that Emax fraudulently inducing them into signing the lease and that Emax had a duty to protect their lease from drainage. The court, while recognizing that “[w]here the same lessee holds under two adjoining lessor, he may not fraudulently or evasively so drill his wells as to drain the property of one to the detriment of the other,” found that Emax acted in good faith while dealing with the appellants. Additionally, the court held that Emax did not have a duty to protect the lease from drainage because it had surrendered the lease prior to putting the well into production and had done so in accordance with the terms of the lease.

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103 Lowe, *supra* note 90 at 332.
104 *Croston v. EMAX Oil Co.*, 464 S.E.2d 728 (W. Va. 1995).
106 Although the well was capable of producing, actual production was delayed because of the lack of pipelines to transport the gas to market.
108 *Croston*, 464 S.E.2d at 734.
In *Jennings*, the plaintiff asserted claims of failure to develop the property, failure to protect the property from drainage, and fraud. Although the court provides little detail of the facts and remands the case for further proceedings, it does provide some guidance in the opinion. The court finds that if the defendant did in fact act fraudulently by refusing to further develop the leasehold and, for depriving the plaintiff of profits, it should be punished by partial or complete termination of the lease. The court, in providing guidance to the lower court, recognizes that deference must be shown to the producer in deciding when and how many wells to drill, but goes on to state that a producer

... must deal with the leased premises, not exclusively to serve his own peculiar and selfish interests, unmindful of his obligations to the source from which his authority is derived, but so as to promote the mutual advantage and profit of himself and the lessor. ... As in all other contracts, so in this he must act and perform the contract so as to subserv the original purpose and intention of the parties. Hence the practically universal interpretation of oil and gas leases is that, where the contract does not expressly state what shall be done by the lessee, there arises the legal implication that if the latter finds one or both of these minerals on a lease operated by him, or if he or other operators find them on adjoining lands, he will drill as many wells as will afford sufficient protection against drainage and otherwise so develop the leases premises as to serve the mutual benefit of both lessor and lessee.\(^\text{109}\)

When new technologies are successfully used on adjoining properties, lessees are likely to bring claims for drainage and demand that the lessor employ similar technologies on their leasehold.

§ 13.08. **Horizontal Development Concerns.**

Horizontal drilling poses numerous other issues for the oil and gas industry to overcome. We can only briefly discuss many of these issues because they will certainly be impacted by pending legislation and court cases.

\(^{109}\) *Jennings*, 80 S.E. at 370.
1. **Water.** Development of the Marcellus formation has brought water usage and conservation to the forefront of the Departments of Environmental Protection in West Virginia, Pennsylvania and New York. Two major components of the water issues include the potential for federal regulation of hydraulic fracturing under the Clean Water Act and water usage regulations being promulgated by the states.

2. **Zoning.** In Pennsylvania there are ongoing disputes over the rights of municipalities to regulate the location of wells and associated facilities.\(^{110}\)

3. **Land Owner Rights.** In much of the Appalachian Basin, ownership of the surface was severed from the oil and gas long ago. Most severance deeds and leases explicitly grant the oil and gas owner or lessee the right to use as much as the surface as is necessary to produce oil and gas. Recently, with the increase in drilling, especially in the Marcellus shale region, surface owners have begun to organize and exert political pressure on legislatures to expand the surface owners’ rights beyond what is contained in the granting instruments. Additionally, surface owners are likely to try any creative legal means to prevent drilling upon their surface or to require additional payments for use of the surface.

4. **Post-Production Costs.** In *Kilmer v. Elexco Land Services, Inc., and Southwestern Energy Production Company*,\(^ {111}\) a Pennsylvania court was asked to interpret the “Minimum Royalty Act”\(^ {112}\) as guaranteeing lessor a 1/8th royalty and not allowing the deduction of post-production costs. The Pennsylvania Supreme Court recently

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granted an appeal to hear the question without prior review by the superior court.\textsuperscript{113}

\section*{§ 13.09. Conclusion.}

For nearly twenty years producers have been refining the process of drilling horizontal wells in the Appalachian Basin. In the last few years, the technology has advanced to a point few expected. This has occurred within the legal framework that developed around vertical drilling and ancient case law. As more horizontal wells are drilled, legislation and case law will likely develop to address some of the issues discussed in this chapter. Hopefully, the law will develop in ways to encourage, rather than hinder, the efficient development of the vast amounts of natural gas reserves in the Appalachian Basin.

\footnotesize\textsuperscript{113} By order issued on June 19, 2009, the court expedited briefing and scheduled oral arguments for September 16, 2009.