

KENTUCKY OIL AND GAS CONSERVATION LAWS: KEEPING PACE WITH TECHNOLOGICAL ADVANCES IN THE OIL AND GAS INDUSTRY

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I. INTRODUCTION

Oil and gas conservation laws, such as rules governing well spacing, limit strict application of the rule of capture. The rule of capture remains a fixture in resolving ownership disputes despite having been modified by courts to address a few specific situations since its initial adoption. Many of Kentucky's oil and gas conservation laws result directly from application of the rule of capture.

Laws governing conservation of oil and gas developed as knowledge of the mechanisms of oil and gas occurrence and production grew. Tremendous losses of recoverable resources that occurred in association with many early discoveries have largely been eliminated through control of waste and application of well and boundary line spacing requirements. The intent of well and boundary line spacing laws is to approximate the drainage area for a given well in order to maximize production, limit reservoir damage, and to protect correlative rights of adjoining owners by preventing drainage.

The advent of horizontal drilling caused a significant wrinkle in the application of oil and gas well spacing regulations. Prior to the invention of horizontal drilling, well spacing laws were based on horizontal distances from a single point, the wellhead. Now, the same spacing laws that apply to vertical wells

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are applied along the length of the horizontal well within the producing formation. The question remains as to whether the assumptions on which well spacing distances are based apply equally to horizontal wells.

Furthermore, the combined use of horizontal wells and hydraulic fracturing has opened a vast new frontier of oil and gas development in unconventional resources like shale gas and shale liquids. Unconventional reservoirs have completely different production characteristics than conventional reservoirs, yet Kentucky's spacing laws are applied in the same way to both types of reservoirs. Oil and gas conservation laws in Kentucky and other states have been specifically amended to address issues related to horizontal drilling and hydraulic fracturing. Whether such changes are adequate to address ever-advancing technology remains to be seen.

II. THE RULE OF CAPTURE AND OWNERSHIP OF OIL AND GAS

The rule of capture is used to determine ownership of oil and gas. In 1935 Robert Hardwicke described the rule of capture as "the owner of a tract of land acquires title to the oil and gas which he produces from wells drilled thereon, though it may be proved that part of such oil and gas migrated from adjoining lands."¹ With regard to capture under Kentucky law, "oil and gas are not the property of anyone until reduced to actual possession."² Although it is common to reserve or grant "oil and gas" via deed, what is actually being reserved or granted is the right to "capture" oil or gas.³ As noted in *Hammonds v. Central*

¹ See Bruce M. Kramer and Owen L. Anderson, *The Rule of Capture - An Oil and Gas Perspective*, 35 Env'tl. L. Rev. 899, 900 (2005) (quoting Robert Hardwicke, *The Rule of Capture and its Applications as Applied to Oil and Gas*, 13 Tex. L. Rev. 391, 393 (1935)).

² *Hammonds v. Central Ky. Nat. Gas Co.*, 75 S.W.2d 204, 205 (1934), *overruled by* *Texas American Energy Corp. v. Citizens Fidelity Bank & Trust Co.*, 736 S.W.2d 25 (1987).

³ It is important to distinguish the rule of capture from the right of capture. The rule of capture is a means for determining ownership of oil and gas. The right of capture is among the bundle of rights that are granted with conveyance of an estate in oil and gas

and represents the right of the owner of the oil and gas estate to drill for and reduce oil and gas to possession. Although ownership of oil and gas is qualified, in that the owner does not own the substances in the manner that solid minerals are owned, the mineral

Ky. Nat. Gas, “the conveyance is in reality the grant of a right in real estate yet to be actually severed or produced, for as to oil and gas not produced, there is no change of title from the common ownership.”⁴

The earliest Kentucky case involving ownership of oil and gas was decided five years before the drilling of the Edwin L. Drake well in Pennsylvania, which is commonly recognized as the first well drilled in the U.S. with the intent of establishing commercial production of oil in 1859.⁵ *Hail v. Reed*,⁶ decided in 1854, involved a claim by the owner of a well to recover three barrels of “American Oil” that the defendants had drawn from the well and placed in their own barrels. The case arose from the Cumberland Circuit Court and involved a well known as the Great American Oil Well.⁷ Hail and two others owned the well and had erected a pump and other equipment specifically for the purpose of withdrawing oil from the ground.⁸ The court ultimately found for Hail, stating that Hail had constructed a well with suitable fixtures for the purpose of reaching and obtaining it for its proper uses and for profit.⁹ However, the opinion of the court remains ambiguous as to whether the well was drilled specifically for oil.¹⁰ Hail and his co-plaintiffs lost

owner, or owner of the gas estate, owns the right to explore for and capture gas on his premises and to exclude others therefrom. *Sellars v. Ohio Valley Trust Co.*, 248 S.W.2d 897 (Ky. 1952).

⁴ *Hammonds*, 75 S.W.2d at 205.

⁵ DANIEL YERGIN, *THE PRIZE: THE EPIC QUEST FOR OIL, MONEY & POWER* 26-28 (Simon & Schuster 1991).

⁶ *Hail v. Reed*, 54 Ky. 479 (1854).

⁷ The Great American Oil Well was discovered by an unknown driller in Cumberland County in 1828. Willard Rouse Jillson, *The Re-Born Oil Fields of Kentucky*, REG. OF THE KY. ST. HIST. SOC., Vol. 18, No. 52, January 1920 at 36. The author’s title research in Cumberland County confirms that the well discussed in the case is the same well. Nearby, in what was then Wayne County, and what is now McCreary County, the Beatty well, Kentucky’s first oil well, was discovered in 1818 and was found by a driller seeking brine. *Id.*; see also WILLARD ROUSE JILLSON, *THE FIRST OIL WELL IN KENTUCKY*, 12-13 (Roberts Printing, 1952). By the time of *Hail v. Reed*, it appears that water well drillers in the area were quite familiar with crude oil.

⁸ *Hail*, 54 Ky. at 483.

⁹ *Id.* at 490.

¹⁰ The opinion states that oil was worth \$1.25 per barrel at the time. Based on the consumer price index, the value is equivalent to \$36.40 per barrel today. Samuel H. Williamson, *Annual Inflation Rates in the United States, 1775 - 2016, and the United*

before the trial court.

On appeal, the question presented was whether a “stream” of oil passing under the surface of the ground and reached by pump was personal property, absolutely vested in the owner of the ground and fixtures, such as to entitle him to recover the oil from a trespasser who draws and appropriates it to his own use.¹¹ Defendants Reed and Alexander argued that the oil was taken from a “freehold” by their labor and at their expense and that the oil was attached to the freehold until severed therefrom by them — in other words, the plaintiff never owned the oil.¹² They argued that the plaintiff had never reduced the oil to possession, and instead, it was part of a vague and fugitive stream, not confined to possession of the plaintiffs.¹³ The defendants argued to apply the purest form of the rule of capture, wherein the oil became their personal property when it was reduced to possession. They noted that if this was a case for trespass upon the plaintiff’s surface property, damages might be appropriate, but it was not, and the plaintiff had no claim to the oil.¹⁴ Analogizing to cases involving water flowing on the surface, they argued that “the only right is to the temporary use — the right to the current, not to the water itself but a simple ‘usufruct’ while it passes along”¹⁵ and that “no right to the water attaches above the usufruct until it is actually appropriated, separated from the stream and so secured as to prove its identity.”¹⁶

This argument reflects a common misunderstanding at the time of the decision — that oil occurred underground as a flowing stream. Professor Owen L. Anderson described the understanding as follows:

The Re-Born Oil Fields of Kentucky, Jillson states that the early production secured a price per barrel of about \$340.00 per barrel. Jillson, *supra*, note 7, at 37. This calculation was based upon sale at that time of half pint bottles at fifty cents apiece (\$0.50 x 16 half pints/gallon x 42 gallons/barrel). At a price of \$340.00 per barrel, it is difficult to comprehend that no one decided to drill a well specifically in search of oil and gas for 30 years after the first Kentucky discovery, and five years after *Hail v. Reed*.

¹¹ *Hail*, 54 Ky. at 484.

¹² *Id.* at 486.

¹³ *Id.*

¹⁴ *Id.* at 482-83.

¹⁵ *Id.* (quoting 2 BOUV. INST. No. 1612, 175). “Usufruct” is defined as “the right of enjoying a thing, the property of which is vested in another, and to draw from the same all the profit, utility, and advantage which it may produce, provided it be without altering the substance of the thing.” BLACK’S LAW DICTIONARY, 1384 (5th Ed. 1979).

¹⁶ *Id.* at 485.

Many drillers . . . believed that oil and gas behaved much like a wild animal beneath the subsurface — constantly on the move. Thus the trick was to drill many wells to capture as much oil as possible as it passed beneath the driller's surface. If the driller delayed, the oil might move on to other property.¹⁷

Oil and gas are now known to occur in discrete traps or fixed by molecular forces in certain formations such as shale or coal.¹⁸

In opposition, the plaintiffs in *Hail* argued that the case was more analogous to the case of coal or mineral embedded in the earth. In that instance, the owner of the freehold opens a way of access, where before it (the coal or mineral) is dug, it is the property of the owner of the soil, and the mere act of digging the resource up and carrying it away will not change the right of property.¹⁹ Interestingly, they acknowledged that the owner of a freehold acquires no property rights in the water of a running stream upon the surface of the earth of which he is the owner, until he reduces it into actual possession by putting into barrels, pipes, cisterns, or in some other way confining it.²⁰ However, they argued that this principle does not apply in the case of a stream or pool of oil found beneath the surface of the owner's land ,

¹⁷ Owen L. Anderson, *Foreword: The Evolution of Oil and Gas Conservation Law and the Rise of Unconventional Hydrocarbon Production*, 68 ARK. L. REV. 231, 233 (2015).

¹⁸ See Michael F. Geiger, LLC v. United States, 456 F. Supp. 2d 885, 887 (W.D. Ky. 2006) (discussing how gas occurs in coal and other formations); see also *United Carbon Co. v. Campbellsville Gas Co.*, 18 S.W.2d 1110 (Ky. 1929) (finding natural gas was more in the nature of subterranean percolating waters than subterranean streams). The court stated as follows:

It is well understood among oil operators that the fluid is found deposited in a porous sand rock . . . below the surface. The rock is saturated . . . and when the hard stratum overlying it is pierced by the drill the oil and gas find vent and are forced, by the pressure to which they are subject, into and through the well to the surface An oil or gas well may . . . draw its product from an infinite distance, and in time exhaust a large space The vagrant character of the mineral, and the porous sand-rock in which it is found . . . fully justify the general conclusion we have stated above, and have led to its general adoption by practical operators. *United Carbon Co.*, 18 S.W.2d at 1113 (quoting *Wettengel v. Gormley*, 28 A. 934, (1894)).

¹⁹ *Hail*, 54 Ky. at 480-81.

²⁰ *Id.* at 479-80.

accessible only through the opening in the earth.²¹ Adopting the reasoning of Blackstone, plaintiffs argued that if a man was regarded as having the exclusive ownership in a well, he should be regarded as having exclusive property in all that the well contains, whether it be water or oil. If the land owner has a right in the contents of a well, no act by a trespasser in carrying off its contents can change his or her rights in those contents.²²

Ruling for the plaintiffs, the court distinguished the defendants' analogies to the use of surface water. The court noted that while water may be found almost everywhere for the common use of man, nature furnishes oil only as the result of arduous labor and intricate processes.²³ Instead, the court focused on the similarity of an oil well to that of a natural spring, noting that the owner of land on which a spring is found is entitled to all advantages arising from it, without regard to the convenience or advantage of others.²⁴

[I]f the water in a spring is found on his land is this his exclusive property, there seems to be much more reason to say that the water at the bottom of a well which he has by his labor and expense constructed for the very purpose of returning water in it for his use and of facilitating the access to it, is his exclusive property. And still stronger is the reason for considering him the exclusive owner of oil, a peculiar liquid not necessary nor indeed suitable for the common use of man, and for reaching and obtaining which for its proper uses and for profit, he has constructed a well with suitable fixtures.²⁵

The court was of the opinion that whether water or oil was running through the well in a stream or not, when it is drawn out

²¹ *Id.* at 480.

²² *Id.*

²³ *Id.*

²⁴ *Id.*

²⁵ *Id.* at 490.

by the owner, it is their exclusive property..²⁶ The *Hail* court held that when oil has migrated into a well, it belongs to the person who owns the right to use the well.²⁷ So long as the owner has created such a receptacle for accumulating oil, the owner is entitled to possession. However, if it leaves the well before being drawn up, it is no longer reduced to possession and, therefore, is no longer “owned” by the landowner.²⁸

There has been little change in the capture rule since it was initially applied in *Hail* in 1854. In *Commonwealth v. Trent*, the Kentucky Court of Appeals held that reducing gas to possession did not entitle the owner thereof to do with it as he pleased.²⁹ In that case, the Commonwealth alleged that the defendants, under the pretense of using natural gas in manufacturing “lampblack”, were, in actuality, extracting it to waste and deplete the gas territory in Meade County over the course of six months from December 1901 to June 1902.³⁰ The court concluded that this was a statutory violation³¹ prohibiting such a waste of natural gas.³²

Nearly three decades later in *United Carbon Co. v. Campbellsville Gas Co.*,³³ a corporation's used a compressor to

²⁶ *Id.*

²⁷ *Id.*

²⁸ See e.g., *Hammonds v. Central Ky. Nat. Gas Co.*, 75 S.W.2d 204, 205 (Ky. 1934) (“Except the easement to explore for and develop, the conveyance is in reality the grant of right in real estate yet to be actually severed and produced, for as to oil and gas not discovered and produced, there is no change of title from the common ownership.”) Consistent with the current law of ownership of oil and gas in Kentucky that an oil and gas owner does not own the oil and gas in place (with the exception of stored gas) but actually only owns the right to extract oil and gas from the property.

²⁹ *Commonwealth v. Trent*, 77 S.W. 390, 393 (Ky. 1903); see also *Louisville Gas Co. v. Ky.*, 77 S.W. 368 (Ky. 1903); *Calor Oil & Gas Co. v. Franzell*, 109 S.W. 328 (Ky. 1908); *Louisville Gas Co. v. Ky. Heating Co.*, 111 S.W. 374 (Ky. 1908).

³⁰ *Trent*, 77 S.W. at 391.

³¹ Law of May 11, 1892, ch. 39, §1-6, 1892 Ky. Acts 60-62; Law of May 14, 1899, ch. 100, §3910-3914, 1899 Ky. Acts 1571-574.

³² *Trent*, 77 S.W. at 393 (stating, “the position that the defendants may do what they please with the gas after it is reduced to possession by them cannot be maintained The right of the owner of the property to do with it as he pleases is subject to the limitation that he must have due regard for the rights of others”, and recognizing that conserving gas served the common good, the court held that “[t]o allow the storehouse of nature to be exhausted by the waste of the gas would be to deprive the state and its

citizens of the many advantages incident to its used.”).

³³ *United Carbon Co. v. Campbellsville Gas Co.*, 18 S.W.2d 110 (Ky. 1929).

remove natural gas by suction from certain wells producing gas near the city of Campbellsville, Kentucky. Unlike in *Trent*, the gas was being used for legitimate purposes.³⁴ After recognizing that owners of oil wells have the right to pump oil in order to extract it, the court found that owners of land containing natural gas have an analogous right, as long as it is for a legitimate purpose.³⁵ The adjoining landowner was instructed that pursuant to the capture rule, he could always go and do likewise.

The Kentucky Court of Appeals's next significant discussion of oil and natural gas ownership and the capture rule was in *Hammonds v. Central Kentucky Natural Gas Co.*³⁶ Hammonds was a landowner who owned an unleased fifty-four acre tract within the boundary of a 15,000 acre natural gas storage field.³⁷ The plaintiff brought suit to recover for use and occupation of her property under trespass theory, charging that gas was placed under her property without her knowledge or consent.³⁸

The court addressed the *Hail* opinion and noted a line of Kentucky cases recognizing that an owner of land under which oil and gas lies is the absolute owner of those resources in place, in the same manner, and to the same extent as an owner of solid minerals, while still subject to escape.³⁹ Yet, based on the fact that it may be lost, the court recognized that oil and gas are not the property of anyone until reduced to possession by extraction.⁴⁰ The surface owner, or a severed mineral estate owner, retains the exclusive right to acquire and appropriate the oil and gas directly beneath.⁴¹

The court analogized to the law of wild animals, noting that if one captures a fox in a forest and turns it loose in another, or if he catches a fish and puts it back in the stream at another point, he has done with migratory, common property the same

³⁴ *Id.* at 1114 (stating that the court could find "no sinister purpose").

³⁵ *See e.g., id.* at 1113 (finding it persuasive that the use of nitroglycerin was allowed to stimulate flow of gas in the well).

³⁶ *Hammonds v. Central Ky. Nat. Gas Co.*, 75 S.W. 2d 204 (Ky. 1934).

³⁷ *Id.* at 204.

³⁸ *Id.*

³⁹ *See e.g., id.* at 205.

⁴⁰ *Id.*

⁴¹ *Id.*

thing as with gas injected into the storage field.⁴² Therefore, the court held that the plaintiff could not recover for trespass from the defendant because the defendant no longer owned the gas once it was re-injected.⁴³ Essentially, the court let the plaintiff know that although she could not recover for wrongful use of the formation under her land by the gas storage company, she could drill a well on her own property and produce injected gas from the storage field to the full extent of the rule of capture.

Hammonds remained Kentucky law until 1987 when *Texas American Energy Corp. v. Citizens Fidelity Bank & Trust Co.*⁴⁴ altered the holding. The case addressed the question of whether re-injected gas was real property or personal property for purposes of creating a security interest under the Uniform Commercial Code.⁴⁵ Rejecting the notion from *Hammonds* that re-injecting the gas was tantamount to releasing a wild animal, the court held that gas becomes personal property once reduced to possession and retains that character even if re-injected into a well-defined storage field.⁴⁶ However, the rule of capture would still apply upon gas escaping from the storage field, and the court held that natural gas that escapes is no longer owned until recovered again.⁴⁷ In other words, the gas does not return to the wild (and common ownership) unless it escapes from the storage field.⁴⁸

In *Bowles v. Hopkins County Coal*,⁴⁹ a case involving coal bed methane, the Kentucky Court of Appeals held that the right to capture natural gas in a coal seam was conveyed with coal mining rights, despite the fact that the agreement did not

⁴² *Id.* at 206.

⁴³ *Id.*

⁴⁴ *Tex. Am. Energy Corp. v. Citizens Fid. Bank & Trust Co.*, 736 S.W.2d 25 (Ky. 1987).

⁴⁵ *Id.* at 25-26.

⁴⁶ *Id.* at 28.

⁴⁷ *Id.* A question that was not addressed by the court is whether an owner of land over a well-defined storage field who is un-leased (or un-condemned) has any right to take the gas.

⁴⁸ *Id.* It is important to note that the court specifically referred to a “well-defined” storage field. This limitation prevents the operator of a storage field from claiming ownership of gas produced from the same formation, in the proximity of, but not actually in, the limits of the storage field.

⁴⁹ *Bowles v. Hopkins Cnty. Coal*, 347 S.W.3d 59 (Ky. 2011).

mention the right to capture or natural gas rights, in any way.⁵⁰ The holding creates two separate estates involving the rule capture, one within the strata conveyed with the coal mining rights and the other estate applicable to all other strata owned by the grantor of the coal mining rights.⁵¹ Although conveyances of oil and gas rights in discrete formations had passed the right of capture as to those formations, *Bowles v. Hopkins County Coal* was the first case in Kentucky in which a court held that conveying coal rights included the right to capture other resources within the coal. However, the right of capture within the coal bed was lost once the coal mining process was complete.⁵²

III. THE DEVELOPMENT OF CONSERVATION LAWS IN KENTUCKY

Development of oil and gas resources continued virtually unregulated for many years after *Hail v. Reed*, and the rule of capture was applied consistently as large discoveries occurred across the United States. The effect was that when a discovery was made, adjoining landowners drilled offset wells as quickly and as close as possible to the discovery well in order to capture oil or gas. The image of town-lot drilling or the drilling of individual wells on many separate small, adjacent tracts, became very common. The most enduring picture came from Spindletop⁵³

⁵⁰ *Id.* at 64.

⁵¹ *Id.* Left unresolved by this holding, and not addressed by the parties, is how spacing laws are impacted. Although ordinarily applied to horizontal distances, there is nothing in the statutes that limits their application to the horizontal plane. Consequently, it could be argued that spacing laws would prohibit the owner of one mineral estate, the owner right of capture in a coal seam, from producing gas in violation of the spacing requirements of KRS § 353.610, which requires 500 foot spacing from an adjoining mineral boundary for natural gas wells.

⁵² *Id.*

⁵³ See Anderson, *supra* note 17, at 235. At Spindletop, in 1901 the first well gushed uncontrollably an estimated 70,000 to 100,000 barrels per day until it was brought under control. Soon, wells were so closely spaced that one could walk from derrick to derrick without touching the ground. The field stopped producing 7 years after the first well because the reservoir energy was inefficiently dissipated by the rapid production. A similar scene developed in Los Angeles in the 1890s with the development of the Los Angeles City Oil field, in which over 500 wells were drilled in its 700-acre area by 1897. To see photographs from Spindletop, visit the Lamar University Spindletop Gladys City Boomtown, Lamar University, 5550 Simmons Blvd, Beaumont, TX 77705, and online at

in Beaumont, Texas, but the same scene was reported in Kentucky.⁵⁴

“Waste” of oil and gas was statutorily prohibited as early as 1892 in Kentucky, but it was waste in the form of allowing oil or gas to be released uncontrollably to the environment rather than waste in terms of preventing damage to a reservoir. The 1892 statute was passed “to prevent the wasting of petroleum, natural gas, salt water, and to provide for the plugging of all abandoned wells.”⁵⁵ The act required that upon finding petroleum, natural gas, or salt water in a well, the well must be shut in or confined within three months until the petroleum, natural gas, or salt water could be utilized.⁵⁶ The bill also required that wells were to be plugged upon abandonment or cessation of operations and gave owners of lands adjoining an unplugged well the right to enter onto the property, take possession of the well, plug it, and maintain a civil action against the owner or person abandoning the well.⁵⁷ The bill was passed to become immediately effective, “inasmuch as large quantities of petroleum, natural gas and salt water are now flowing to waste in this State from wells which have been abandoned and never plugged up”⁵⁸

Despite early attempts to prohibit waste, uncontrolled application of the capture rule led to tremendous loss of resources.⁵⁹ There was little to no understanding of the relation between the rate of production and the amount that might

⁵⁴ STANLEY C. HEROLD, OIL WELL DRAINAGE 278-79 (Stanford U. Press 1941) (expounding upon the negative impacts of town-lot drilling in Paleozoic formations and used the Livermore, Kentucky oil field as an example: Town-lot drilling in fields of Paleozoic production is disastrous. It has been and always will be so without exception. The drainage partitions separating the cones of the wells block off the productive formations into portions, which have lateral dimensions comparable with those of houses in which we live. Of course the partitions extend from the floor to the ceiling of the formations, but there can be no great quantities of oil and gas in such spaces; consequently, there can be no great quantities of oil and gas produced by wells with their drainage confined by so close spacing. The histories of the McKeesport gas field in Pennsylvania, developed in 1917, and the town-lot section of the Livermore oil field in Kentucky, developed in 1936, are well remembered by those who contributed to the drilling of wells that were exhausted within six months after being placed on production.).

⁵⁵ KY. REV. STAT. ANN. § 353.150 (1892) (codifying 1892 Ky. Acts 60).

⁵⁶ *Id.* § 353.150(1).

⁵⁷ *Id.* § 353.150(2)-(5).

⁵⁸ *Id.* § 353.150(6).

⁵⁹ See Anderson, *supra* note 17, at 232-33.

ultimately be recovered from a well, pool, or field.⁶⁰ The end result of the combination of town-lot or too-close spacing and unrestrained production of oil and gas from each well was that reservoirs would be prematurely drained of pressure. An excellent example of this was the great Lima-Indiana field, also known as the Trenton Gas Field in Northern Ohio and Indiana, which at the turn of the century accounted for one-third of oil production in the United States.⁶¹ In that field, gas was simply released indiscriminately in order to obtain oil as quickly as possible, resulting in the loss of over 1 trillion cubic feet of natural gas as well as reservoir pressure.⁶² The loss in reservoir pressure and questionable drilling practices that resulted in water infiltration significantly diminished the amount of oil that might otherwise have been recovered.⁶³

The lessons from Spindletop and other early fields led the Texas Railroad Commission to promulgate Rule 37 on November 26, 1919.⁶⁴ That rule provided for minimum spacing between wells, and read as follows:

No well for oil or gas shall hereafter be drilled nearer than three hundred (300) feet to any other completed or drilling well on the same or adjoining tract or farm; and no well shall be drilled nearer than one hundred and fifty (150) feet to any property line; provided that the Commission, in order to prevent waste or to protect vested rights, will grant exceptions permitting drilling within shorter distances than as above prescribed, upon application filed fully stating the facts, notice thereof having first been given to all adjacent lessees affected thereby⁶⁵

⁶⁰ *Id.*

⁶¹ See YERGIN, *supra* note 5, at 52.

⁶² See *Oil and Gas, a Brief Overview of the Petroleum Industry In Indiana*, IND. GEOLOGIC SURV., <https://igs.indiana.edu/OilGas/History.cfm#gsc.tab=0> (last visited Mar. 15, 2017) [<https://perma.cc/VV7T-SBTN>].

⁶³ *Id.*

⁶⁴ Philip Brin, Note, *Oil and Gas-The Spacing Rule of the Railroad Commission-Rule 37*, 13 TEX. L. REV. 119 (1934).

⁶⁵ Rule 37 of the Railroad Commission, pursuant to that authority of General Laws of Texas (1919) 285, c. 155, S.B. 231, now 16 TEX. ADMIN. CODE §3.37.

According to the court in *Railroad Comm'n of Texas v. Bass*, the rule had a conservation basis and was promulgated for the purpose of minimizing fire hazards as well as to minimize the danger of water percolation into the oil stratum.⁶⁶ As opposed to surface waste, Rule 37 was designed to conserve oil and gas by prohibiting “economic waste” or “underground waste”, that is, undue harm to the reservoir from drilling too many wells too closely together.⁶⁷

Around the same time the Texas Railroad Commission was working on Rule 37, several large discoveries were occurring in Kentucky, among them the discovery in 1918 of the Big Sinking Field, Kentucky’s only giant oil field, with a production of more than 100 million barrels.⁶⁸ The same year, Swiss Oil, Inc., the precursor to Ashland Oil, was formed and began development of the Martha Oil Field in Lawrence and Johnson County shortly thereafter.⁶⁹ And in 1919, the Ross Creek pool was called the most active pool in eastern Kentucky, which was brought on by the division and sale of a large tract into drilling lots of twenty by forty feet.⁷⁰

The unrestrained race for production created great pressure on lessees to offset newly found production and lead to the creation of an implied duty to develop production in leases

⁶⁶ *Railroad Comm'n of Texas v. Bass*, 10 S.W.2d 587 (1928).

⁶⁷ “Economic waste” is defined as “an overproduction or excessive drilling of oil or gas.” *Economic Waste*, BLACKS LAW DICTIONARY (5th Ed. 1979). An alternate definition is “the drilling of wells in excess of the number necessary for the recovery of the oil and gas in place. *Economic Waste*, WILLIAMS AND MEYERS, OIL AND GAS TERMS (6th Ed. 1984). “Underground waste” has been defined as (1) the inefficient, excessive, or improper use or dissipation of reservoir energy, including gas energy and water drive, of any pool, and the locating, spacing, drilling, equipping, operating, or producing of any well or wells in a manner to reduce or tend to reduce the total quantity of oil or casing-head gas ultimately recoverable from any pool, and (2) unreasonable damage to underground fresh or mineral waters, natural brines, or other mineral deposits from operations for the discovery, development, and production and handling of oil or casing-head gas. M.C.L.A. § 324.61501.

⁶⁸ Brandon C. Nuttall, *Oil and Gas History of Kentucky: 1900 to Present*, KY. GEOLOGICAL SURV. (Dec. 2016), <https://www.uky.edu/KGS/emsweb/history/modern.htm> [https://perma.cc/87HT-22AA].

⁶⁹ *Id.*

⁷⁰ *Id.*; see Brandon C. Nuttall, *Ross Creek, Estill County, Eastern Kentucky*, KY. GEOLOGICAL SURV. (Dec. 7th, 2004), <https://www.uky.edu/KGS/emsweb/history/rossckph.htm> [https://perma.cc/L2RC-KPQV].

adjacent to producing leases.⁷¹ Wells on property that produced oil from adjoining properties were known as “robber wells.”⁷² An operator’s failure to adequately and promptly offset robber wells could lead to forfeiture of the lease, or, if the lease was producing, forfeiture of the areas of the lease that the operator had not drilled.⁷³

Partly for this reason, a bill was passed by the Kentucky General Assembly in 1920 to “standardize, validate, define and enforce contracts and leases for lands leased for oil and gas purposes and to provide for how and when off-set wells shall be drilled.”⁷⁴ The bill was designed to govern relations between lessors and lessees relating to interpretation of leases. Section 4 of the act was the first Kentucky law to relate remotely to well spacing and addressed the issue of when a lessor could seek to cancel a lease due to non-development by the lessee. Section 4 provided as follows:

That in the event of oil or gas being discovered in paying quantities on an adjoining leasehold and the products therefrom being taken out of the ground and marketed and said well is within two hundred feet of another lessor’s property line, then within three months after written notice has been given lessee to the effect that such oil or gas has commenced to be transported off and marketed from the said adjoining premises the lessee or lessees of the land lying within two hundred feet of the said wells shall begin to drill an offset well to each of such wells so located, provided said offset

⁷¹ See *e.g.*, *Hughes v. Busseyville Oil & Gas Co.*, 203 S.W. 515, 517 (Ky. 1918) (finding found “[f]orfeiture for non-development or delay is essential to private and public interest in relation to the use and alienation of property” and that “[p]erhaps in no other business is prompt performance of contracts so essential to the rights of the parties, or delay by one party likely to prove so injurious to the other.”).

⁷² See *Lawrence Oil Corp. v. Metcalfe*, 100 S.W.2d 217, 218 (1936).

⁷³ *Hughes v. Busseyville Oil & Gas Co.*, 203 S.W. 517 (Ky. 1918) (quoting *Monarch Oil Gas & Coal Co. v. Richardson*, 99 S.W. 668, 669 (Ky. 1907) (stating “the lessee will not be permitted to hold the land for speculative or other purposes an unreasonable length of time for a mere nominal rent, when a royalty on the product is the chief object for the execution of the lease.”)).

⁷⁴ See KY. REV. STAT. § 353.040 (1942) (codifying Ky. Acts 1920, ch. 24).

wells to drilled are not less than five hundred feet of each other, and upon his failure to so commence same with diligence the said contract and lease shall automatically expire and become null and void. Provided, this shall not apply to leases that are being operated, or on which wells are being drilled.⁷⁵

The law included the arbitrary presumption, to be repeated later, that wells within 200 feet of the boundary line were close enough to affect production on the adjoining lease, and the lessor could only demand that the lessee take action to drill offset wells if that condition was met.⁷⁶ However, under the statute, the lessee was prohibited from drilling wells on its leased property closer than 500 feet together. Although this language appears at first blush to establish minimum spacing for offset wells, the statute was later clarified to state, “the offset wells need not be less than five hundred (500) feet from each other.”⁷⁷ So rather than a provision governing conservation of oil and gas, the provision was intended to be a limitation on the obligation of the lessee to meet the demands of the lessor. The lessee could satisfy his obligations after notice under the statute if he drilled offset wells that were 500 feet apart and was not required to drill them on closer spacing, even if so drilled on the adjoining land.

The statute was passed at a time when there was no limitation on drilling within a specified distance of an adjoining mineral boundary. So wells could be drilled as close to a property line as possible, and under the capture rule, these wells could drain adjoining property indiscriminately. And the adjoining landowner could also drill as close as possible to the line. The statute merely encouraged operators to take full advantage of the capture rule.

⁷⁵ *Id.*

⁷⁶ See S.S. Willis, *Kentucky Law of Oil and Gas*, 13 KY. L. J. 3, 5 (1924) (recognizing the arbitrariness of the statute, Willis described Section 4 as “a rather arbitrary regulation regarding off-set wells applicable throughout the State regardless of the particular facts or conditions.”).

⁷⁷ The statute was not amended by the General Assembly but appears to have been changed by the Kentucky Statute Revision Commission between 1942 and 1944. See KY. REV. STAT. § 353.040 (1944).

As early as 1922, Kentucky State Geologist Willard Rouse Jillson clearly recognized that legislation was necessary to conserve oil and gas resources, primarily out of concern of diminishing supplies of natural gas.⁷⁸

It has been stated that, "in reference to natural gas, a great and pressing necessity is to stop its appalling waste by enacting and enforcing proper legislation. This ideal fuel should be used with the severest economy in order to prolong its life, which will be brief at best." The study of existing conditions of supply and demand and their probable future trend of relationship, affords a basis for the consideration of the problems surrounding the conservation of natural gas. It is definitely known that the natural gas supplies once considered illimitable are in fact very limited, and rapidly approaching exhaustion. The word rapidly may be used in its fullest sense, for there is probably no other natural resource in all the world, certainly not in the United States, which is as near commercial exhaustion as is natural gas.⁷⁹

* * * *

The producer of natural gas on leased property is not concerned, does not want to be concerned, at all in the matter of the most efficient present and extended use of the supplies which he controls. His interest is based on that unsound yet widely popular principle of American business which requires the largest possible return in the shortest possible period. Naturally, to gain his ends he cannot consider any principle of conservation, as his selfish motives necessarily imply a disregard or

⁷⁸ See WILLARD ROUSE JILLSON, CONSERVATION OF NATURAL GAS RESOURCES OF KENTUCKY (1st ed. 1922).

⁷⁹ *Id.* at 124 (quoting C.R. VAN HISE, CONSERVATION OF NATURAL RESOURCES IN THE UNITED STATES 360 (The MacMillan Co., 1910)).

true conservation.⁸⁰

Jillson pessimistically stated that, “in Kentucky, it is the owner’s full and legal right to dispose of it or use it in almost any way he chooses. In fact, there is nothing to prevent a 100 percent waste of the natural gas under any lease in Kentucky, if the owner chooses to allow it.”⁸¹ Jillson recognized that laws prevented waste, but that such laws were of little effect.⁸²

In 1922, the use of natural gas for the manufacture of carbon black, a process which was considerably less than 5 percent efficient, was viewed as a great waste of natural gas for industrial purposes.⁸³ Almost twenty years prior to Jillson’s writing, Kentucky’s highest court had upheld the enjoining of a sham “lamp black” (carbon black) factory from purposely wasting gas in order to destroy the business of the Kentucky Heating Company.⁸⁴ Such laws were still of little effect seven years after Jillson’s writing. In 1929, the court in *United Carbon Co. v. Campbellsville Gas Co.* noted that, “in the early history of the (Campbellsville) gas field of Taylor and Green counties, the gas pressure was quite strong, but, due to the activities of a carbon black plant, which has since been dismantled, the gas pressure has steadily declined. . .”⁸⁵

Jillson proposed the following principles as measures of natural gas conservation:

- (1) the prompt closing of gas wells;
- (2) the proper casing of gas wells to prevent underground waste;
- (3) the proper casing and tubing and packing of gas wells to prevent waste;
- (4) regulation of the amount of gas which may be used in firing well drilling broilers and the method of burning such gas;
- (5) outlawing the use of the gas flambeaux or torch;
- (6) *the drilling of fewer offset wells*;
- (7) the proper plugging of oil, gas, and salt water sands;
- (8) outlawing the practice of blowing gas wells to

⁸⁰ *Id.* at 126.

⁸¹ *Id.* at 128.

⁸² *Id.*

⁸³ *Id.* at 129.

⁸⁴ *Louisville Gas Co. v. Ky. Heating Co.*, 77 S.W. 368 (Ky. 1903).

⁸⁵ *United Carbon Co. v. Campbellsville Gas Co.*, 18 S.W.2d 1110 (Ky. 1929).

secure oil; (9) the outlawing of extensive blowing of gas wells in order to free them from water; (10) *proper regulation of the lowering of rock pressure in order to avoid too rapid a diminution of natural gas flow*.⁸⁶

In addition to preventing physical waste through intentional release, production, and casing practices, Jillson also proposed to prevent unnecessary reservoir depletion, economic waste, and underground waste by limiting the drilling of offset wells and controlling production rates.⁸⁷ These same measures had been imposed by Texas Rule 37.⁸⁸ However, Kentucky did not take action in this regard until 1942.⁸⁹

Henry Doherty, who controlled several companies during the 1920s, including Cities Service Oil and Gas, was an early advocate for limiting well multiplication and rapid oil production that would otherwise drain reservoir pressure.⁹⁰ Like Jillson's conservationist reaction to his observation of diminishing resources, Doherty also advocated for conservation based on his observation of decreased reservoir pressure.⁹¹ He proposed that fields should be unitized or operated as single units with production apportioned among the various owners in order to allow oil to be recovered and pressure to be decreased at a rate judged most sound by current engineering knowledge.⁹² Doherty advocated that the United States Government should impose such requirements.⁹³

Partially at Doherty's insistence, President Calvin Coolidge established the Federal Oil Conservation Board in 1924 to investigate wasteful production methods in the interest of national security.⁹⁴ Nevertheless, the industry was divided on the need for conservation, and, if required, how it would be implemented, as evidenced by American Petroleum Institute's then counsel and future Chief

⁸⁶ WILLARD ROUSE JILLSON, CONSERVATION OF NATURAL GAS RESOURCES OF KENTUCKY 142 (John P. Morton & Co., 1st ed. 1922) (emphasis added).

⁸⁷ *Id.*

⁸⁸ 16 TEX. ADMIN. CODE § 3.37 (2017).

⁸⁹ KY. REV. STAT. ANN. § 353.160 (LexisNexis 2017).

⁹⁰ See YERGIN, *supra* note 5, at 220-21.

⁹¹ *Id.* at 221.

⁹² *Id.*

⁹³ *Id.*

⁹⁴ *Id.* at 222.

Justice of the United States Supreme Court, Charles Evans Hughes's remarks at the May 27, 1926 Federal Oil Conservation Board Public Hearing.⁹⁵ Hughes spoke in opposition to proposed federal conservation regulation and was skeptical of state-imposed requirements.⁹⁶ In response to concerns about diminishing reserves, Hughes stated, "Even Spindletop, the first of the Texas gusher fields and member of a class of notoriously short-lived, after a lapse of twenty-five years, produce each day its 1200 barrels of oil."⁹⁷

Doherty refuted his testimony, who said, "I have heard Mr. Hughes's presentation. I do not totally disagree with it, but I do disagree with it in nearly all of its important points."⁹⁸ Doherty submitted a written response after the hearing, indicating just how divisive the issue was within the industry.⁹⁹ Gradually the industry came around, recognizing low-cost production was also the most-efficient method of production.¹⁰⁰ The industry eventually agreed (consistent with the 1922 position of Kentucky Chief Geologist Jillson) unitization was one of the best ways to achieve conservation because fewer wells were needed, allowing more reliance on natural underground pressure to move oil and gas toward wells.¹⁰¹

While moving slowly regarding oil and gas conservation, the Kentucky General Assembly passed a coal conservation law affecting oil and gas operations in 1928.¹⁰² Kentucky Acts 1932, Ch. 98, was the first comprehensive statute governing oil and gas operations as well as relationships between oil and gas operators and the operators of coal mines. The stated purpose was as follows:

An ACT relating to the safe development and operation of minerals; providing regulations for the location of oil and gas wells and the operation and abandonment of the same through workable beds of coal; regulating coal mining operations within the

⁹⁵ See Federal Oil Conservation Board, May 27, 1926 Public Hearing (1926).

⁹⁶ *Id.* at 8.

⁹⁷ *Id.*

⁹⁸ *Id.* at 24.

⁹⁹ *Id.* at 38.

¹⁰⁰ See YERGIN, *supra* note 5, at 222.

¹⁰¹ *Id.*

¹⁰² KY. REV. STAT. ANN. §§ 353.050-140 (codifying Coal Conservation Act, ch. 98, 1932 Ky. Acts 498-501).

vicinity of such wells, defining the respective duties of the owners and operators for said minerals and the State Department of Mines, prescribing full procedure for carrying into effect all the provisions, and providing penalties for any violation of this Act; and repealing all laws or parts of laws in conflict herewith.¹⁰³

The bill did not govern well spacing, except where locations might be affected by proximity to mining operations. The bill first required the preparation of a plat showing the exact location of the well, but only on tracts known to have underlying coal bearing strata.¹⁰⁴ The plat was to be sent to the coal owner or operator, who was given five days from receipt of the plat to object to the location of the well on the ground that the well would endanger the use of present or future operations of a workable coal bed.¹⁰⁵ The remedy provided to the coal operator was not a complete bar on drilling the well but, rather, a change in location to a new location as near as possible to the original location.¹⁰⁶

The bill also provided requirements for casing and abandoning wells drilled through workable coal beds.¹⁰⁷ The bill first required coal mining operations to notify the well operator and the Kentucky State Department of Mines and Minerals (“Department”) any time the coal operator planned to extend mine workings within 500 feet of an existing well and gave the well operator the right to object to such activities.¹⁰⁸ Consequently, as of 1932, the Kentucky General Assembly was focused upon resolving issues arising between coal mining operations and oil and gas operations when the activities could affect miner safety or impact the future production of coal. As might be expected in Kentucky, the primary focus was on the conservation of coal.

¹⁰³ *Id.*

¹⁰⁴ KY. REV. STAT. ANN § 353.050.

¹⁰⁵ KY. REV. STAT. ANN § 353.060.

¹⁰⁶ *Id.*

¹⁰⁷ KY. REV. STAT. ANN §§353.080-130.

¹⁰⁸ KY. REV. STAT. ANN §353.140.

By the end of the 1920s, there had been many more large oil discoveries in the U.S., leading to unrestrained production. This was fueled by the rule of capture and resulted in damage to reservoirs and created a huge oversupply of crude oil, negating Jillison's and Doherty's concerns.¹⁰⁹ It was this huge oversupply that finally convinced the industry to begin seriously considering oil and gas conservation and production control — not necessarily as a means to conserve production, but to control prices.¹¹⁰

In 1930, Columbus “Dad” Joiner drilled the discovery well in the East Texas Field, which would turn out to be the largest conventional oil field ever discovered in the lower forty-eight United States.¹¹¹ By the first week of June 1931, more than 1,000 wells had been drilled in the field, and it was producing 500,000 barrels per day.¹¹² In response to this immense production, against considerable resistance from the judiciary, the Texas Railroad Commission prorated production from the field to maintain reservoir pressure, but this proration also had the effect of temporarily stabilizing oil prices.¹¹³ However, illicit production of “Hot Oil,” or oil illegally produced in excess of allowed quotas, continued, driving the prices back down.¹¹⁴ In response to market turmoil and in cooperation with the Federal Government, the Interstate Oil Compact was formed in 1935.¹¹⁵ States in the compact, primarily Texas and Oklahoma (the states with the largest production at the time) imposed quotas on their production and the price of oil stabilized.¹¹⁶

In 1936, the Kentucky General Assembly passed an act to prevent physical waste or escape of natural gas from any well or pipeline.¹¹⁷ The Act did not require any specific construction requirements to prevent waste, and “waste” was given its

¹⁰⁹ See YERGIN, *supra* note 5, at 223.

¹¹⁰ *Id.* (“The reason was no longer to forestall an imminent shortage, since the mounting proof of the opposite was all too evident. Rather, it was to prevent the ruinous floods of flush production that so violently shook the pricing structure.”).

¹¹¹ *Id.* at 246-47.

¹¹² *Id.* at 247.

¹¹³ *Id.* at 251.

¹¹⁴ *Id.*

¹¹⁵ *Id.* at 257.

¹¹⁶ *Id.* at 257-59.

¹¹⁷ KY. REV. STAT. ANN §§ 353.150–160 (codifying An Act for the Conservation of Natural Gas and Prevention of its Waste, Ky. Acts 1936, ch. 35 88-90).

common law meaning at the time, which was “the unnecessary loss or destruction of natural resources.”¹¹⁸ The Act created a presumption of negligence against the well operator arising from the waste or escape.¹¹⁹ The Act also required conservation of natural gas that occurred in association with crude oil, to the extent that waste was not necessary for production of oil.¹²⁰ Although aimed at conserving natural gas, in the case of gas discovered in association with crude oil, conservation of gas would also promote maintenance of reservoir pressure.

In 1942, during the Second World War, The Kentucky General Assembly passed a resolution ratifying and approving the Interstate Oil Compact to Conserve Oil and Gas.¹²¹ Article III of the Compact stated as follows:

Each State bound hereby agrees that within a reasonable time it will enact laws, or if any laws have been enacted, then it agrees to continue the same in force, to accomplish within reasonable limits the prevention of:

- (a) The operation of any oil well with an inefficient gas-oil ratio.
- (b) The drowning with water of any stratum capable of producing oil or gas, or both oil and gas in paying quantities.
- (c) The avoidable escape into the open air or the wasteful burning of gas from a natural gas well.
- (d) The creation of unnecessary fire hazards.
- (e) The drilling, equipping, locating, spacing, or operating of a well or wells so as to bring about physical waste of oil or gas or loss in the ultimate recovery thereof.
- (f) The inefficient, excessive or improper use of the reservoir energy in producing any well.

The enumeration of the foregoing subjects shall not

¹¹⁸ *Id.*

¹¹⁹ *Id.*

¹²⁰ KY. REV. STAT. ANN § 353.160(3).

¹²¹ Act of Mar. 2, 1942, ch. 267, 1942 Ky. Acts 973, 973-79.

limit the scope of the authority of any State.¹²²

By adopting the Compact, Kentucky had agreed, within a reasonable time, to enact laws regarding the locating and spacing of wells and operating requirements that would ensure maximum recovery of resources as a means of controlling “economic waste.”

In 1955, the Moore Oil Co. drilled the No. 1 Carl Perkins in Green County. This well produced sixty-five barrels of oil per day and was the discovery well for the Greensburg oil pool in Green and Taylor counties, which turned out to be the second largest reservoir of hydrocarbons in the state.¹²³ The oil pool was in contact with the Campbellsville gas pool, which had previously been depleted; this could have had a significant impact on ultimate production from the field.¹²⁴ By 1958, up to 200 rigs were operating each day drilling new wells in the field, which produced 10 million barrels in 1959.¹²⁵

By 1961, 3,000 producing wells had been drilled in a productive area of 15,000 acres, and over 17 million barrels had been produced.¹²⁶ However, at the time of the discovery, Kentucky still had not adopted significant oil and gas conservation laws, and records of the early development of the field were scant. From early development, oil production was commonly related to pumping large volumes of salt water, and without spacing regulations, large production in 1958 and 1959 resulted in tremendous volumes of improperly-disposed salt water.¹²⁷ Production in the field sharply declined during the next decade following the 1958 peak.¹²⁸

Experiences at the Greensburg pool provided a significant impetus for Kentucky to finally adopt oil and gas conservation

¹²² *Id.* at Article III, 975.

¹²³ HOWARD R. SCHWALB & EDWARD N. WILSON, GREENSBURG CONSOLIDATED OIL POOL, GREEN AND TAYLOR COUNTIES, KENTUCKY (1972); ROBERT E. KING, STRATIGRAPHIC OIL AND GAS FIELDS-CLASSIFICATION, EXPLORATION METHODS AND CASE HISTORIES 579, 579 (1972).

¹²⁴ *Id.* at 582-83.

¹²⁵ Brandon C. Nuttall, *Oil and Gas History of Kentucky: 1900 to Present*, KY. GEOLOGIC SURV., <https://www.uky.edu/KGS/emsweb/history/modern.htm> (last visited Jan. 4, 2017) [<https://perma.cc/KG2M-XB8M>].

¹²⁶ SCHWALB & WILSON, *supra* note 123, at 579-80.

¹²⁷ *Id.*

¹²⁸ *Id.* at 580.

laws.¹²⁹ In 1960, the General Assembly passed Kentucky Acts 1960, ch. 103 (now KRS § 353.500 to § 353.720), which explicitly gave the Department authority over oil and gas conservation.¹³⁰ The 1960 Act adopted well and boundary spacing requirements that were applicable statewide.¹³¹ Section 3(3) of the Act prohibited production of oil and gas from any new well in violation of the spacing requirements.¹³²

Section 13(1) of the Act, codified as KRS § 353.610(1), applied to spacing of wells drilled for the production of oil and provided that no permit would be issued for drilling, deepening or reopening of any well for the production of oil, unless the proposed location was at least two hundred feet from the nearest boundary of the premises.¹³³ If the proposed location was less than 400 feet from any boundary line of the premises, the proposed location was required to be at least 400 feet from the nearest oil producing well.¹³⁴ Section 13(2), KRS § 353.610(2), of the Act was worded similarly but applied to wells drilled for the production of natural gas.¹³⁵ The equivalent spacing requirements for natural gas wells were 500 feet and 1,000 feet.¹³⁶

However, Section 14(1) of the Act, KRS § 353.620(1), offered an alternate means of determination of adequate spacing.¹³⁷ If the prospective well operator obtained the consent of all owners of oil and gas interests in any premises that would be offset by the proposed well, the well operator would be allowed to drill, deepen, or reopen a well closer to the boundary or to another well than prescribed in Section 13.¹³⁸ Furthermore, section 14(2) of the Act, KRS § 353.620(2), provided that an operator could avoid the spacing limitations if he could prove in a hearing that topographical or other conditions made compliance

¹²⁹ *Id.*

¹³⁰ KY. REV. STAT. ANN. §§ 353.500–720 (codifying An Act Relating to the Regulation, Conservation and Production of Oil and Gas, Ky. Acts 1960, ch. 103, 393).

¹³¹ KY. REV. STAT. ANN. § 353.500(1).

¹³² KY. REV. STAT. ANN. § 353.520(3).

¹³³ KY. REV. STAT. ANN. § 353.610(1).

¹³⁴ *Id.*

¹³⁵ KY. REV. STAT. ANN. § 353.610(2).

¹³⁶ *Id.*

¹³⁷ KY. REV. STAT. § 353.620(1).

¹³⁸ *Id.*

with the spacing requirements of Section 13 unduly burdensome or in conflict with reasonably prudent methods and practices for the production of oil or gas.¹³⁹ However, there is no provision that would allow the Division of Oil and Gas to impose greater spacing distances if necessary.

Section 14(3) of the Act provided that if a variance of the spacing requirements was granted under one of the preceding sections, the owners of all premises “off-set” and adversely affected by the well were entitled to similar variances from spacing requirements.¹⁴⁰ Provisions that allow neighboring landowners to waive the spacing requirements of the 1960 Act indicate that the provisions still were not necessarily geared toward conservation of oil and gas, as much as protecting adjoining landowners from drainage. With approval of the adjoining landowner, wells could be drilled and produced without regard to efficiency.¹⁴¹ Furthermore, spacing requirements could be avoided if topography (e.g., hills too steep to build a location) or other conditions rendered compliance with the spacing requirements of Section 13 unduly burdensome.¹⁴² And if one operator was allowed to avoid spacing requirements, operators on adjoining tracts “adversely affected” by the well were also allowed to avoid such requirements.¹⁴³

If a particular tract was so situated because of size or other condition that it did not contain a location at which a well could be drilled, deepened, or reopened due to the spacing provisions of Section 13 of the Act, the Department was given authority to order, after a hearing, the pooling of all oil and gas interests in the tract with a contiguous tract in order to create one location that complied with the spacing provisions.¹⁴⁴ This process is known as forced pooling. A pooling order allows operators to disregard the boundary-spacing requirement if

¹³⁹ KY. REV. STAT. ANN. § 353.620(2) An operator is allowed to seek different minimum spacing between wells. If the operator can prove that with respect to his pool or field, the ordinary spacing requirements are in conflict with reasonably prudent methods for the production of oil or gas, then the department can allow smaller spacing between wells.

¹⁴⁰ KY. REV. STAT. ANN. § 353.620(3).

¹⁴¹ KY. REV. STAT. § 353.620(1).

¹⁴² KY. REV. STAT. ANN. §§ 353.500–720.

¹⁴³ KY. REV. STAT. ANN. § 353.500(1).

¹⁴⁴ KY. REV. STAT. ANN. § 353.630.

necessary to comply with the spacing requirements for adjoining wells.

By requiring compliance with well spacing and providing for pooling orders, the 1960 Act incorporated the concepts of unitization and prevention of "economic waste." Interestingly however, Section 25 of the 1960 Act specifically stated that, "[t]his Act shall not be construed to authorize any limitation of production of oil or gas from any well, lease, pool, field, or property to prevent or control economic waste or to limit production to market demand."¹⁴⁵ Despite this language, by imposing minimum spacing and limiting well density, there is no question that the Act was intended to limit production to control economic waste.

As was the case in the 1920 Act,¹⁴⁶ regarding offset wells. The operative distances for spacing of oil and gas wells in the 1960 Act (200 feet from adjoining property lines and 400 feet from other wells for oil wells, 500 feet from adjoining property lines and 1,000 feet from other wells for gas wells) were purely arbitrary numbers. The actual drainage area of any particular well will depend on numerous factors, including horizontal and vertical permeability of the strata from which substances are produced and the location of faults or other geologic features. For example, a single gas well at the highest point of a large conventional gas pool could theoretically drain all of the free gas from the pool, regardless of the horizontal extent of the field.¹⁴⁷ However, the 1960 Act did not provide specific authority for the Department to change spacing distances in the event that an operator could establish that different spacing rules should apply.

A side effect of the adoption of spacing laws was the creation of a cause of action for encroachment or trespass for wells drilled too close to an adjoining property. In *Howard v. Kingmont Oil Co.*, Howard sued Kingmont Oil Co. for producing oil from a well located too close to property Howard had under lease.¹⁴⁸ After winning damages from Kingmont, Howard appealed the method of calculating damages because the trial

¹⁴⁵ *Supra* note 121 at § 25 (codified at KY. REV. STAT. ANN. § 353.720(1)).

¹⁴⁶ Ky. Acts 1920, ch. 24 (codified at KY. REV. STAT. ANN. §§ 353.010-353.040).

¹⁴⁷ *United Carbon Co. v. Campbellsville Gas Co.*, 18 S.W.2d 1110, 1113 (1929).

¹⁴⁸ *Howard v. Kingmont Oil Co.*, 729 S.W.2d 183 (Ky. App. 1987).

court method of spacing the wells was to draw a circle with a 330 foot radius around the well, and the part of the circle that was over the line was considered to be encroachment.¹⁴⁹ Howard unsuccessfully contended that the court should have placed the well in the center of a square with 660 foot sides, which would have increased his amount of recovery.¹⁵⁰ This action could not have been asserted prior to the passage of spacing rules since Kingmont's well was clearly drilled on its own lease, and the capture rule would have prevented any action by Howard.

In 1974, the General Assembly enacted numerous conservation-related provisions. The definition of "waste" was amended to encompass the concept of "economic waste," or waste that causes, or tends to cause, a reduction in the quantity of oil or gas ultimately recoverable from a pool under prudent and proper operation, and the drilling or more wells than are reasonably required to recover efficiently the maximum amount of oil and gas from a pool.¹⁵¹ At the same time, KRS § 353.610(1) was amended to change the spacing requirements for oil wells to 330 feet from the nearest boundary, and 660 feet from the nearest oil producing well.¹⁵² With this change, the state adopted ten acre spacing for new oil wells, which had been applied in other areas of the country for many years. For example, in the 1928 case of *Railroad Commission of Texas v. Bass*, the court stated, "It was shown that in sand of the character of the stratum in this field, a well will drain approximately 10 acres, or 660 feet square."¹⁵³ However, a new provision was added, KRS § 353.610(3)(e), that kept in effect the prior spacing of 200 and 400 feet for proposed oil wells of less than 2,000 feet in depth that would not penetrate workable coal beds and only when "the formation from which the oil is expected to be extracted is not appreciably affected by factors, as determined by the commissioner, other than natural drainage."¹⁵⁴

¹⁴⁹ *Id.* at 185.

¹⁵⁰ *Id.*

¹⁵¹ An Act Relating to Oil and Gas Conservation, Ky. Acts 1974, ch. 45, 41 (codified at KY. REV. STAT. ANN. §§ 353.520(a) and (f)).

¹⁵² *Id.* at § 4 (codified at KY. REV. STAT. ANN. § 353.610).

¹⁵³ *Railroad Com. of Tex. v. Bass*, 10 S.W.2d 586, 587–88 (1928).

¹⁵⁴ An Act Relating to Oil and Gas Conservation, Ky. Acts 1974, ch. 45, 41

The increase in spacing footage, while still using arbitrary numbers, apparently was in recognition that the drainage area of oil wells was likely greater than 200 feet surrounding the well, and in the interest of lowest-cost production, a larger drainage area could be assumed. However, if it is assumed that the provision had a conservation basis, the exemption of KRS § 353.610(3)(e) for certain shallow wells implies that the drainage area for shallower wells would be different than deeper wells. Given that the exemption only applies in non-coal bearing areas, it appears again that the adoption of ten-acre spacing was driven in part by interest in conservation of coal resources.

Also in 1974, the General Assembly passed a law governing "Deep Wells," which were defined as wells drilled below the depth provided for a "Shallow Well."¹⁵⁵ "Shallow well" was defined as any well drilled and completed at a depth less than 4,000 feet except, in the case of any well drilled and completed east of longitude line 84 degrees 30'; shallow well means any well drilled and completed at a depth less than 4,000 feet or above the base of the lowest member of the Devonian Brown Shale, whichever is deeper.¹⁵⁶ To provide oversight of the Deep Well program, the law created the Kentucky Oil and Gas Conservation Commission, charged with responsibility for the establishment and regulation of drilling units in order to "prevent reasonably avoidable net drainage from each developed unit (that is, drainage which is not equalized by counterdrainage) so that each owner in a pool shall have the right and opportunity to recover his fair and equitable share of the recoverable oil and gas in such pool."¹⁵⁷

The law provides that four members of the Commission shall be appointed by the Governor, and that the fifth member shall be the Director of the Division of Oil and Gas.¹⁵⁸ When the law was passed, Commission members other than the Chairman, were entitled to receive thirty-five dollars per diem, not to exceed one hundred days per year, while actually engaged in his duties as a member of the Commission.¹⁵⁹ The Commission was given

(codified at KY. REV. STAT. ANN. § 353.610(3)(e)).

¹⁵⁵ *Id.* at § 5-7 (codified at KY. REV. STAT. ANN. § 353.510(16)).

¹⁵⁶ *Id.* at § 1(15) (codified at KY. REV. STAT. ANN. § 353.510(15)).

¹⁵⁷ *Id.* at § 5(1)(a) (codified at KY. REV. STAT. ANN. § 353.651(1)(a)).

¹⁵⁸ *Id.* at § 3(2) (codified at KY. REV. STAT. ANN. § 353.565(1)).

¹⁵⁹ *Id.* at § 3(4) (codified at KY. REV. STAT. ANN. § 353.565(4)). The per diem is

power to establish spacing requirements for each particular field within its jurisdiction on a case-by-case basis,¹⁶⁰ and was also given authority to establish statewide spacing requirements for deep formations.¹⁶¹ Deep drilling units were prohibited from being smaller than the maximum area that can be drained efficiently by one (1) deep well so as to produce the reasonable maximum recoverable oil or gas in such area.¹⁶²

In 1975, the Commission promulgated regulations governing the spacing of deep wells, drilling units, and the pooling of interests.¹⁶³ A “Wildcat well” was defined by the regulations as those drilled with the intent of discovering and producing hydrocarbons from a formation not previously productive of oil or gas from a well within 25,000 feet from its location, or if less than 25,000 feet from a previously productive well in a pool, was drilled in such geologic conditions that it could not produce from a previously productive pool.¹⁶⁴ Provided the deep well met those requirements, it was otherwise only subject to the statewide spacing requirements of KRS § 353.610.¹⁶⁵

Separate spacing rules applied to deep gas wells other than wildcat wells or wells drilled on a unit previously formed by the commission. Applications for deep gas wells less than 7,000 feet deep were required to include a plat showing a proposed unit comprising a square with sides of 3,500 feet, and if greater than 7,000 feet deep, the proposed unit was required to comprise a square with sides of 5,000 feet.¹⁶⁶ Deep oil wells were required to be part of a square unit with sides of 1,750 feet if less than 7,000 feet deep, and if more than 7,000 feet deep, they were required to be part of a square unit with sides of 2,500 feet.¹⁶⁷

now \$150.00, not to exceed 100 days per year. In comparison, members of the Kentucky Public Service Commission received a salary of \$113,121 in 2016. *See* Council of State Governments, *Selected State Administrative Officials: Annual Salaries 2016*, THE BOOK OF STATES, <http://knowledgecenter.csg.org/kc/content/book-states-2016-chapter-4-state-executive-branch> [https://perma.cc/ZX83-RF7C].

¹⁶⁰ *Id.* at § 5(1)(b) (codified at KY. REV. STAT. ANN. § 353.565(5)).

¹⁶¹ *Id.* at § 5(1)(b).

¹⁶² *Id.* at § 5(1)(d) (codified at KY. REV. STAT. ANN. § 353.651(1)(d)).

¹⁶³ 2 Ky. Admin. Reg. 155 (Sept. 1975) (codified at 805 KY. ADMIN. REG. 1:100. (2017)).

¹⁶⁴ *Id.* at § 3(1) (codified at 805 KY. ADMIN. REG. 1:100 § 4(1)(a) (2017)).

¹⁶⁵ *See* KY. REV. STAT. ANN. § 353.610.

¹⁶⁶ 2 Ky. Admin. Reg. 155 (Sept. 1975) (codified at 805 KY. ADMIN. REG. 1:100 § 4(1)(a) (2017)).

¹⁶⁷ *Id.* at § 4(1)(b).

Unless an exception was granted, deep gas wells less than 7,000 feet in depth could not be located less than 1,072 feet of the boundary of the proposed unit, and deep gas wells more than 7,000 feet deep could not be located less than 1,532 feet of the boundary of the proposed unit.¹⁶⁸ Also, deep oil wells less than 7,000 feet deep could not be less than 536 feet from the boundary of the proposed unit, and deep oil wells more than 7,000 feet deep could not be drilled within 766 feet of the boundary of the proposed unit.¹⁶⁹ The Director, however, was allowed to grant exceptions from the distances set forth above when justified by topographical or geologic conditions.¹⁷⁰ When a deep well penetrated a new pool, the operator was required to, within 120 days after a test is completed or the well is completed as a producible well, or within sixty days of a confirmation well in the pool, request a hearing for the commission to issue special field orders governing the spacing of wells and the establishment of units in the pool.¹⁷¹

Kentucky did not adopt a statute pertaining to unitization, whether voluntary or at the instance of the Department, until 1994.¹⁷² Prior to this Act, there was no express statutory authority, except in the case of deep wells, pursuant to which the Division of Oil and Gas could compel uncooperative operators or landowners to participate in a unit. Unless a lease included a unitization clause, or the operator obtained the consent of the lessor, unitization would not occur. However, many fields were operated on a unit basis in Kentucky prior to enactment of this statute.

In 2015, the Kentucky General Assembly passed the Kentucky Oil and Gas Regulatory Modernization Act of 2015.¹⁷³ That Act established new rules governing remediation of abandoned storage tanks, imposed reclamation requirements on all new wells drilled in the state, created new rules relating to

¹⁶⁸ *Id.* at § 4(2).

¹⁶⁹ *Id.* at § 4(3).

¹⁷⁰ *Id.* at § 4(4)(b).

¹⁷¹ *Id.* at § 7.

¹⁷² An Act Relating to Oil and Gas Unitization and Definitions Relating thereto, Ky. Acts 1994, ch. 431, 1418 (codified at KY. REV. STAT. ANN. § 353.645).

¹⁷³ Ky. Oil and Gas Regulatory Modernization Act, ch. 21, 2015 Ky. Acts 114 (codified at KY. REV. STAT. ANN. §§ 353.500-353.720).

high-volume hydraulic fracturing operations and imposed new requirements regarding deep horizontal wells. The new law did not change spacing requirements, but it did change the definition of “deep well” to one that is either more than 6,000 feet deep or, if to the east of longitude 84 degrees 30 minutes, 6,000 feet or below the lowest member of the Devonian Brown Shale, whichever is deeper.¹⁷⁴ Among other requirements, the net effect of the Regulatory Modernization Act was to make statewide spacing requirements for shallow wells applicable to wells up to 6,000 feet deep.

The Kentucky Oil and Gas Conservation Commission promulgated amended regulations governing Permitting and Spacing of Deep Wells that became effective September, 2015. The new regulations changed the distance defining “wildcat wells,” to 10,000 feet down from 25,000 feet.¹⁷⁵ More significantly, the amendments added provisions for horizontal wells and made the existing provisions for spacing and units applicable solely to vertical deep wells.¹⁷⁶ With respect to deep horizontal wells, the commission rules provide for case-by-case spacing determination.¹⁷⁷

However, although the Kentucky Oil and Gas Regulatory Modernization Act changed the definition of “deep well” to the deeper of 6,000 feet or to the base of the Devonian Brown Shale, the new Commission regulations did not change the previous regulatory threshold of 7,000 feet for a change in vertical deep well spacing requirements. With the passage of the new Act and the almost simultaneous promulgation of new deep well regulations, Kentucky’s spacing requirements vary somewhat randomly with depth. Certain oil wells less than 2,000 feet deep may be drilled within 400 feet from other wells. Oil wells less than 6,000 feet deep may be drilled within 660 feet of other wells in the same formation. Oil wells that are 6,000 to 7,000 feet deep may be drilled within 1,072 feet of other wells producing from the same formation, and oil wells greater than 7,000 feet deep may be drilled within 1,532 feet of other wells in the same unit. There is

¹⁷⁴ KY. REV. STAT. ANN. § 353.510(16).

¹⁷⁵ 805 KY. ADMIN. REGS. 1:100 § 1(18).

¹⁷⁶ 805 KAR 1:100 § 4. *Id.* at § 3-5.

¹⁷⁷ *Id.* at § 5.

no geological reason why wells 6,000 to 7,000 feet deep should be subject to different spacing requirements, and the regulations could be simplified to apply to all wells 6,000 feet and deeper.

IV. MODERN DEVELOPMENTS AFFECTING CONSERVATION LAWS

Evolving technology has enabled the development of vast new oil and gas reserves from unconventional sources that were economically unrecoverable in the past. Horizontal drilling has given drillers the opportunity to significantly increase access to pathways for production from oil and gas-bearing tight formations such as shales. Coupled with hydraulic fracturing, which helps to create such pathways for production, this combination of technologies has greatly increased the amount of available oil and gas in the United States.

A. The Effects of Horizontal Drilling

One of the most significant developments in the oil and gas industry in the last fifty years has been the development and refinement of horizontal drilling technology. Horizontal drilling has led to the development of huge new oil and gas reserves from unconventional sources.¹⁷⁸ Serious interest in horizontal drilling began in the 1970s and 1980s.¹⁷⁹ Early efforts were aimed at enhancing well productivity, reducing water and gas coning, intersecting natural fractures, and improving well economics.¹⁸⁰

¹⁷⁸ For purposes of this paper, horizontal drilling means deviating the drill bit from vertical and drilling through formations horizontally. For a detailed definition of the term horizontal drilling, see Anderson, *supra* note 17 at 249 (quoting SCHLUMBERGER OILFIELD GLOSSARY, www.glossary.oilfield.slb.com/Terms/h/horizontal_drilling.aspx (last viewed Dec. 18, 2016)) [<https://perma.cc/575F-EEAU>].

¹⁷⁹ S.D. JOSHI, SOCIETY OF PETROLEUM ENGINEERS, COSTS/BENEFITS OF HORIZONTAL WELLS 1 (2003) *available at* <http://www.joshitech.com/images/spe83621.pdf> [<https://perma.cc/E44Y-7Y4A>]; *see* UNITED STATES ENERGY INFORMATION ADMINISTRATION, DRILLING SIDEWAYS – A REVIEW OF HORIZONTAL WELL TECHNOLOGY AND ITS DOMESTIC APPLICATION 7 (1993) (“The first recorded true horizontal well [was drilled in Texas] in 1929.”), *available at* https://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/drilling_sideways_well_technology/pdf/tr0565.pdf [<https://perma.cc/8UBE-GH5Y>].

¹⁸⁰ *See* UNITED STATES ENERGY INFORMATION ADMINISTRATION, DRILLING SIDEWAYS – A REVIEW OF HORIZONTAL WELL TECHNOLOGY AND ITS DOMESTIC APPLICATION 7 (1993) (The first recorded true horizontal well [was drilled in Texas] in

Through the early 1980s, several companies were using horizontal technology in an attempt to intersect fractures in carbonate reservoirs in Oklahoma, Kansas, and Texas.¹⁸¹ Horizontal well technology has progressed significantly in the thirty years since, and now multi-lateral wells from a single drill pad are common.¹⁸²

The primary benefits of horizontal wells are higher rates of production and recoverable reserves as compared to vertical wells.¹⁸³ Generally, horizontal wells have a significant gain in production as well as rate of production but a much shorter life than vertical wells.¹⁸⁴ Despite the increased rate of production, the flow geometry associated with a horizontal well helps to reduce the amount of water or gas infiltration in any given reservoir.¹⁸⁵

Horizontal drilling turns some of the assumptions on which well spacing are based on their “side.” Horizontal wells can penetrate the same formation for thousands of feet, greatly increasing the amount of formation that is open and accessible for migrating gases and fluids. For example, in a producing zone five feet thick, a vertical well would penetrate five feet of the formation, thereby exposing five feet of the formation to an avenue for production. In comparison, a horizontal well with a 2,000-foot lateral in the same formation would expose the same amount of formation to production as 400 vertical wells. Using the current 660-foot spacing between wells, the same area would be drained by 3 vertical wells, drilled though a total of fifteen feet of formation.

In a formation that is uniform in all directions, the drainage pattern of a vertical well is assumed to be uniform in all directions as well, resulting in drainage of an equivalent distance

1929.”), *available at* https://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/drilling_sideways_well_technology/pdf/tr0565.pdf [<https://perma.cc/69X9-YSG7>].

¹⁸¹ *Id.* at 8-9.

¹⁸² *Id.* at 2.

¹⁸³ *Id.* at 3.

¹⁸⁴ David Summers, *What Advances in Horizontal Drilling Mean for Shale Oil*, BUS. INSIDER (Nov. 15, 2009), *available at* <http://www.businessinsider.com/what-advances-in-horizontal-drilling-mean-for-shale-oil-2009-11> [<https://perma.cc/27AX-N24C>].

¹⁸⁵ F. Kuchuk et al., *Horizontal Highlights*, MIDDLE EAST WELL EVALUATION REVIEW, at 8 (Nov. 16, 1995), *available at* https://www.slb.com/~media/Files/resources/mearr/wer16/rel_pub_mewer16_1.pdf [<https://perma.cc/5SK9-WXQ4>].

surrounding the well bore, which can be represented by a disc around the well. The drainage pattern of a horizontal well in a uniform formation can be represented by a cylindrical capsule of distance equal to the length of the well bore in the formation. The drainage pattern of a horizontal well is identical to a series of vertical wells drilled along a straight line without regard to horizontal spacing between the wells. The closer each vertical well is to its neighboring well, the more closely the drainage pattern of the series of vertical wells matches that of the single horizontal well.

With respect to horizontal wells, the Division of Oil and Gas adopted the following regulation regarding spacing. “The operator shall satisfy spacing requirements in accordance with KRS § 353.610 or, for deep wells, 805 KAR 1:100 and KRS § 353.651 and § 353.652, of offset mineral boundary lines and between wells for the actual drilled course of the well and its end point and the intersection of the well bore and the producing formations.”¹⁸⁶ Stated differently, the operator is required to maintain 330-foot spacing from existing boundaries and 660-foot spacing from existing wells. However, an operator is able to obtain waivers of these distances with the approval of adjoining landowners directly affected by the well.

Under Kentucky law, from the surface to 6,000 feet in depth, the drainage area of a horizontal well is presumed to extend the same distance from the well bore as the drainage area from a vertical well in the same formation. Although a horizontal well drains more oil at a faster rate, the presumption under the law is that a horizontal well only drains oil up to 330 feet from the well bore. However, as noted above, the actual drainage area in a formation is dependent on numerous factors. The amendments to KRS § 353.651 and new deep well regulations will help to ensure that drilling units and well spacing are based upon scientific factors related to maximizing production.

B. Unconventional Production and Hydraulic Fracturing

Currently, the United States has plentiful supplies of

¹⁸⁶ 805 KY. ADMIN. REGS. 1:140 § 2(5).

natural gas and crude oil, and as a result, prices for these commodities are relatively low as a result. The primary reason for the glut in supply has been the development of unconventional oil and gas resources such as coalbed methane, shale gas, and oil from shales. Kentucky's conservation laws are based upon a history of development of conventional resources. "Unconventional Resource" is defined by Schlumberger as follows:

An umbrella term of oil and natural gas that is produced by means that do not meet the criteria for conventional production. What has qualified as unconventional at any particular time is a complex function of resource characteristics, the available exploration and production technologies, the economic environment, and the scale, frequency and duration of production from the resource. Perceptions of these factors inevitably change over time and differ among users of the term. At present, the term is used in reference to oil and gas resources whose porosity, permeability, fluid trapping mechanism, or other characteristics differ from conventional sandstone and carbonate reservoirs. Coalbed methane, gas hydrates, shale gas, fractured reservoirs, and tight gas sands are considered unconventional sources.¹⁸⁷

Gas has been produced in Kentucky from Devonian shales. Although shale is considered an unconventional resource, gas has been produced from the shales through conventional means with vertical wells since 1892.¹⁸⁸ As of 2007, there were estimated to be more than 6,000 shale gas wells producing

¹⁸⁷ SCHLUMBERGER OILFIELD GLOSSARY, http://www.glossary.oilfield.slb.com/Terms/u/unconventional_resource.aspx (last viewed Dec. 18, 2016) [<https://perma.cc/2GMV-HDHX>].

¹⁸⁸ Brandon Nuttall, *Predicting Cumulative Production of Devonian Shale Gas*

Wells from Early Well Performance Data, KY. GEOLOGICAL SURV., <http://www.uky.edu/KGS/emsweb/devsh/production/index.htm> (last modified Sep. 26, 2012) [<https://perma.cc/8ZVF-26XW>].

between 50 and 70 billion cubic feet annually in Kentucky.¹⁸⁹ However, Kentucky's shale gas production volume pales in comparison to volumes of gas being produced from the Marcellus Shale in Pennsylvania and adjoining states, which was producing approximately 18 billion cubic feet of natural gas *per day* as of November, 2016.¹⁹⁰ The large volumes are being produced as a direct result of horizontal drilling and hydraulic fracturing.

Of similar interest is oil production from the Bakken shale in the Williston Basin of Montana, North Dakota, and South Dakota. In North Dakota, in January 1960, there were thirty-two wells that produced a total of 2,738 barrels of oil per day from the Bakken formation.¹⁹¹ In January, 1980, there were seventeen wells that were producing a total of 459 barrels of oil per day from the Bakken.¹⁹² In January 2006, there were 227 wells producing 4,470 barrels per day.¹⁹³ And as of January, 2016, there were 10,439 wells producing a total of 1,066,266 barrels per day.¹⁹⁴ This incredible increase in production is the direct result of advances in horizontal drilling and hydraulic fracturing.¹⁹⁵

Hydraulic fracturing is a key to development of shales and other low permeability formations. The Texas Supreme Court effectively described hydraulic fracturing in the following passage from *Coastal Oil and Gas Corp. v Garza Energy Trust*:

The Vicksburg T is a “tight” sandstone formation, relatively imporous and impermeable, from which natural gas cannot be commercially produced without hydraulic fracturing stimulation, or

¹⁸⁹ *Id.*

¹⁹⁰ *Marcellus Region Drilling Productivity Report*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/petroleum/drilling/pdf/marcellus.pdf> (last updated Feb. 2017) [<https://perma.cc/XL87-4TQX>].

¹⁹¹ *ND Monthly Bakken Oil Production Statistics*, N.D. INDUS. COMMISSION, <https://www.dmr.nd.gov/oilgas/stats/historicalbakkenoilstats.pdf> (last modified Nov. 2016) [<https://perma.cc/89G4-P4K8>].

¹⁹² *Id.*

¹⁹³ *Id.*

¹⁹⁴ *Id.*

¹⁹⁵ See *How Halliburton advances in horizontal drilling and fracturing helped unlock the Bakken Shale*, HALLIBURTON.COM, http://www.halliburton.com/public/common/Case_Histories/H08944.pdf (last viewed Dec. 18, 2016) [<https://perma.cc/FX37-3QMM>].

“fracing”¹⁹⁶, as the process is known in the industry. This is done by pumping fluid down a well at high pressure so that it is forced out into the formation. The pressure creates cracks in the rock that propagate along the azimuth of natural fault lines in an elongated elliptical pattern in opposite directions from the well. Behind the fluid comes a slurry containing small granules called proppants—sand, ceramic beads, or bauxite are used—that lodge themselves in the cracks, propping them open against the enormous subsurface pressure that would force them shut as soon as the fluid was gone. The fluid is then drained, leaving the cracks open for gas or oil to flow to the wellbore. Fracing in effect increases the well's exposure to the formation, allowing greater production.¹⁹⁷

With respect to unconventional resources (like the Vicksburg T sandstone), drainage area (and therefore optimal well spacing) is dependent on the extent of the natural or induced fracture system. Due to the extremely low permeability in shale formations, gas or fluid flowing through unstimulated shale zones is minimal.¹⁹⁸ Thus, in a shale formation, without hydraulic fracturing, there is virtually no drainage area. Therefore, the drainage area of a hydraulically fractured shale, or other low-permeability formation, is delineated by the area affected by the fracture treatment. Consequently, ordinary spacing laws have little meaning when applied to hydraulically fractured wells. However, states have not generally regulated the area affected by

¹⁹⁶ Although the Merriam-Webster Dictionary adopted the spelling “fracking”, the spelling “fracing” was used by this court and is commonly used by the oil and gas industry. See <https://www.merriam-webster.com/dictionary/fracking>. Last visited April 5, 2017. This article will use the industry spelling of the term.

¹⁹⁷ Coastal Oil & Gas Corp. v. Garza Energy Tr., 268 S.W.3d 1, 6-7 (Tex. 2008).

¹⁹⁸ Zhong He, *Flow of Gas and Water in Hydraulically Fractured Shale Gas Reservoirs*, ENVTL. PROT. AGENCY, <https://www.epa.gov/sites/production/files/documents/flowofgasandwaterinhfshalegasreservoirs.pdf> (Mar. 28-29, 2011); accord Stephen Holditch, *Getting the Gas Out of the Ground*, AM. INST. OF CHEMICAL ENGINEERS, <https://www.aiche.org/sites/default/files/cep/20120841.pdf> (August 2012).

a fracture treatment.¹⁹⁹

Instead, induced hydraulic fractures have been treated as natural fractures for purposes of the capture rule. In *Coastal Oil & Gas Corp. v. Garza Energy Trust*,²⁰⁰ Salinas, a mineral owner on an adjoining tract, brought an action against Coastal alleging that Coastal had trespassed by conducting a large hydraulic fracturing operation that induced fractures, which crossed property lines onto property in which Salinas owned an interest.

The court explained uncertainty inherent in the hydraulic fracturing process:

Engineers design a fracing operation for a particular well, selecting the injection pressure, volumes of material injected, and type of proppant to achieve a desired result based on data regarding the porosity, permeability, and modulus (elasticity) of the rock, and the pressure and other aspects of the reservoir. The design projects the length of the fractures from the well measured three ways: the hydraulic length, which is the distance the fracing fluid will travel, sometimes as far as 3,000 feet from the well; the propped length, which is the slightly shorter distance the proppant will reach; and the effective length, the still shorter distance within which the fracing operation will actually improve production. Estimates of these distances are dependent on available data and are at best imprecise. Clues about the direction in which fractures are likely to run horizontally from the well may be derived from seismic and other data, but virtually nothing can be done to control that direction; the fractures will follow Mother Nature's fault lines in the formation. The vertical dimension of the fracing pattern is confined by barriers—in this case, shale—or other lithological changes

¹⁹⁹ *Coastal Oil & Gas Corp.*, 268 S.W.3d at 16-17.

²⁰⁰ *Id.*

above and below the reservoir.²⁰¹

The court recognized that:

. . . hydraulic fracturing cannot be performed both to maximize reasonable commercial effectiveness and to avoid all drainage. Some drainage is virtually unavoidable. In this context, common law liability for a long-used practice essential to an industry is ill-advised and should not be extended absent a compelling need that the Legislature have ignored. No such need exists.²⁰²

The Coastal Fee No. 1, which was at issue in the case, was designed for the hydraulic length of the job to reach over 1,000 feet from the well, which was called a “massive” job.²⁰³ Experts in the case agreed that the hydraulic and propped lengths of fractures exceeded 660 feet, but they disagreed as to whether the effective length of the fractures actually exceeded that distance.²⁰⁴ The well itself was 467 feet from the boundary of Salinas’s property.²⁰⁵

Salinas argued that intentionally designing the job to extend across property lines was no different than drilling a deviated or slant well to cross property boundaries.²⁰⁶ The court distinguished this argument on the ground that the gas produced from a deviated well does not migrate to the wellbore from another’s property. It is already on another’s property,²⁰⁷ and the court noted that one cannot protect against drainage from a deviated well by drilling his own well, because the deviated well will continue to produce his gas.²⁰⁸ The court stated that, “[t]he rule of capture is justified because a landowner can protect himself from drainage by drilling his own well, thereby avoiding

²⁰¹ *Id.* at 7.

²⁰² *Id.* at 16.

²⁰³ *Id.*

²⁰⁴ *Id.*

²⁰⁵ *Id.*

²⁰⁶ *Id.* at 13–14.

²⁰⁷ *Id.* at 14.

²⁰⁸ *Id.*

the uncertainties of determining how gas is migrating through a reservoir.”²⁰⁹

The court was not persuaded to change the rule of capture to allow the trespass claim.²¹⁰ The court’s reasoning was that: (1) the law already afforded the owner who claims drainage full recourse, for he may drill his own well or may seek forced pooling or he may take action against his own lessee for failure to offset; (2) allowing such a claim would usurp the authority of the Railroad Commission to regulate oil and gas production; (3) determining the value of oil and gas drained by hydraulic fracturing is the kind of issue the litigation process is least equipped to handle; and (4) the rule of capture would not be changed to apply differently to hydraulic fracturing because no one in the industry appeared to want or need the change (referencing amicus briefs filed by numerous industry groups, regulatory bodies, and royalty owner associations).²¹¹

In *Stone v. Chesapeake Appalachia*,²¹² The United States District Court for the Northern District of West Virginia disagreed with the analysis in *Garza*, instead adopting the reasoning of the dissent in that case. The court held that hydraulic fracturing under the land of a neighboring party without that party’s consent is not protected by the “rule of capture”, but rather constitutes an actionable trespass.²¹³ However, the court later vacated the holding in *Stone* on the grounds that the case had been settled.²¹⁴

Regardless of how the question might be resolved in Kentucky, if it ever arises, the decisions illustrate the inherent problems in attempting to regulate the design or size of hydraulic fracturing operations. They also illustrate that any such regulation would be at odds with the notion of maximizing production of oil and gas, especially from unconventional resources. The holding in *Garza* is consistent with the 1929 holding of Kentucky’s highest court in *United Carbon v.*

²⁰⁹ *Id.*

²¹⁰ *Id.* at 14.

²¹¹ *Id.* at 15-16.

²¹² *Stone v. Chesapeake Appalachia, LLC*, No. 5:12-CV-102, 2013 WL 2097397 (N.D.W. Va. Apr. 10, 2013), *vacated*, 2013 WL 7863861 (N.D.W. Va. July 30, 2013).

²¹³ *Id.* at *8.

²¹⁴ *Id.*

*Campbellsville Gas Co.*²¹⁵ There, the court recognized that oil and gas production may be stimulated with nitroglycerine or by use of pumps and compressors, and so long as the stimulation is done for legitimate purposes, the adjoining landowner has no complaint and is protected by his right to do the same thing.

V. SPACING LAWS IN OTHER STATES

Spacing laws vary significantly from state to state. Generally, state spacing requirements establish a default statewide spacing requirement, and then incorporate means for obtaining exceptions. And it is common for states to establish pool or field-specific spacing requirements. States with greater drilling activity have more complicated spacing requirements. Several states regulate well density or the number of wells in a given area, by assigning “drilling units” to each well. For this article, I reviewed spacing and well density requirements in states where large, unconventional resource plays have recently been in the news: Texas (Barnett shale), Oklahoma (Woodford shale), North Dakota (Bakken formation), and Pennsylvania (Marcellus shale).

A. Texas

Oil and gas conservation in Texas is governed by the Texas Railroad Commission, which has jurisdiction over many activities but no longer regulates railroads.²¹⁶ Commissioners are elected by the citizens of Texas to serve six-year terms.²¹⁷ Current compensation for Railroad Commissioners is approximately \$140,000 per year.²¹⁸

²¹⁵ *United Carbon Co. v. Campbellsville Gas Co.*, 18 S.W.2d 1110 (Ky. 1929).

²¹⁶ TEX. NAT. RES. CODE ANN. § 81.051 (West 2015). With respect to Commission authority over railroads, see *Railroads*, Railroad Commission of Texas, <http://www.rrc.texas.gov/about-us/railroads/> (last viewed Feb. 15, 2017) [<https://perma.cc/65W5-4WGW>]; see also *History of the Railroad Commission*, RAILROAD COMMISSION OF TEXAS, <http://www.rrc.texas.gov/about-us/history/history-2000-2009/> (last viewed Feb. 15, 2017) [<https://perma.cc/KLV3-4RNZ>]; see generally *A Chronological History*, RAILROAD COMMISSION OF TEXAS, <http://www.rrc.state.tx.us/about-us/history/a-chronological-history/> (last viewed Feb. 15, 2017) [<https://perma.cc/HY87-W9WZ>].

²¹⁷ TEX. CONST. art 16 § 30.

²¹⁸ See *Government Salaries Explorer*, THE TEX. TRIBUNE, <https://salaries.texastribune.org/state-comptroller-payroll/departments/railroad->

Texas Rule 37 now prohibits wells from being drilled closer than 1,200 feet (previously 300 feet) to any well completed in or drilling to the same horizon on the same tract or farm, and no well may be drilled closer than 467 feet (previously 150 feet) from any property line, lease line, or subdivision line.²¹⁹ However, the Railroad Commission may grant exceptions to permit drilling within shorter distances when the Commission determines that such exceptions are necessary to prevent waste or prevent the confiscation of property.²²⁰ In addition to spacing requirements, density and proration rules are also imposed. The drilling unit size for wells subject to statewide spacing rules is forty acres.²²¹ The Railroad Commission may also impose special field rules.

In the absence of special field rules, Texas Rule 86 governs spacing, density and proration for horizontal wells.²²² Like Rule 37, Rule 86 requires spacing of 467 feet from the adjoining lease line and 1,200 feet between well spacing on the same farm or tract.²²³ Rule 86 allows for a horizontal drilling and proration unit of the applicable acreage for a vertical well in the same field, plus additional acreage in twenty acre increments based on length of the wellbore lying within the producing formation.²²⁴

B. Oklahoma

Oklahoma's conservation laws are overseen by the Oklahoma Corporation Commission.²²⁵ The Corporation Commission regulates certain public utilities, oil and gas, safety aspects of motor carriers, rail and pipeline transportation, and petroleum storage tank systems.²²⁶ Commissioners are elected by the voters of Oklahoma to serve six-year terms.²²⁷ Commissioners receive compensation established by the state legislature each year and currently earn \$107,000 to \$115,000 per year.²²⁸

commission/ (last viewed Feb. 15, 2017) [<https://perma.cc/3JJD-NDS4>].

²¹⁹ 16 TEX. ADMIN. CODE § 3.37 (2004).

²²⁰ *Id.*

²²¹ 16 TEX. ADMIN. CODE § 3.38(b)(2)(A) (2004).

²²² *See* 16 TEX. ADMIN. CODE § 3.86 (2004).

²²³ 16 TEX. ADMIN. CODE § 3.86(b)(1)–(3) (2004).

²²⁴ 16 TEX. ADMIN. CODE § 3.86(d)(1) (2004).

²²⁵ OKLA. STAT. ANN. 17, § 52 (2016).

²²⁶ *See generally* OKLA. STAT. ANN. § 17.

²²⁷ OKLA. CONST. art. 9 § 15.

²²⁸ OKLA. STAT. ANN. 74, § 250.7 (2017); *see State Workers Pay*, OKLAHOMA

Oklahoma's spacing requirements vary by type of well, and specific spacing is imposed for certain formations. Oklahoma issues location-specific spacing units as a result of a hearing before the Commission, allowing one well per unit. Subject to any special order of the Commission, wells that are drilled to a depth of less than 2,500 feet must be located at least 165 feet from any property line or lease line, and not less than 300 feet from any other producible or drilling oil or gas well in the same formation.²²⁹ If the producing formation is deeper than 2,500 feet, the well shall be located not less than 330 feet from any property line or lease line and not less than 600 feet from any producible or drilling oil or gas well.²³⁰ However, the Corporation Commission may establish drilling and spacing units in any common source of supply, and such special orders shall supersede the provisions of OAC 165:10-1-21.²³¹ The permitted well location within any standard square drilling and spacing unit shall be the center of the unit.²³² Within standard rectangular drilling and spacing units, there shall be the centers of alternate square tracts constituting the units, subject to certain tolerances based on the size of the units.²³³

Except as authorized by a special order of the Corporation Commission, the completion interval in horizontal wells in Oklahoma may be no closer than 300 feet from any oil or gas well in the same producing formation, which is less than 2,500 feet deep,²³⁴ and it is not less than 165 feet from the boundary of the mineral estate, leasehold estate, or voluntary unit.²³⁵ For producing formations deeper than 2,500 feet, the completion interval in horizontal wells may be no closer than 600 feet from

WATCH, (Sept. 28, 2015) <http://oklahomawatchdata.org/state-salaries/185> (last viewed Dec. 18, 2016).

²²⁹ OKLA. ADMIN. CODE § 165:10-1-21 (2017).

²³⁰ *Id.*

²³¹ OKLA. ADMIN. CODE § 165:10-1-22 (2017).

²³² OKLA. ADMIN. CODE § 165:10-1-24 (2017).

²³³ *Id.* (For a 640 acre unit, the well may be located no closer than 1,320 feet from the unit boundary, for a 160 acre unit, the well may be no closer than 660 feet from the unit boundary, for a forty acre unit, the well may be no less than 330 feet from the unit boundary, and for a ten acre unit, the well may be no closer than 165 feet from the unit boundary. For 320, eighty, and twenty acre stand up or lay down (rectangular) units, the well may be no closer to the boundary line than that for a 160 acre unit, a forty acre unit, and a ten acre unit, respectively).

²³⁴ OKLA. ADMIN. CODE § 165:10-3-28(c)(2)(A) (2017).

²³⁵ OKLA. ADMIN. CODE § 165:10-3-28(d)(1) (2017).

any other oil or gas well in the same producing formation,²³⁶ and it can be no closer than 330 feet to the boundaries of the mineral estate, leasehold estate, or voluntary unit.²³⁷

The Corporation Commission also has authority, after notice and hearing, to establish horizontal drilling and spacing units.²³⁸ The spacing requirements for the completion interval in a horizontal well unit are identical in conventional reservoirs and unconventional reservoirs, except that in unconventional reservoirs the well spacing is a more generous 330 feet from the boundary line in 320 to 640 acre horizontal well units than the 660 feet from the boundary line for conventional reservoirs.²³⁹ Special rules apply to horizontal wells in the Woodford Shale.²⁴⁰ In that formation, the completion interval in horizontal wells shall be not less than 330 feet from an east or west unit boundary,²⁴¹ and it cannot be less than 165 feet from a north or south boundary.²⁴²

C. North Dakota

North Dakota's oil and gas conservation laws are under the authority of the Industrial Commission of the state of North Dakota.²⁴³ Formed in 1919, the Industrial Commission consists of the Governor, the Attorney General, and the state Agriculture Commissioner.²⁴⁴ North Dakota well spacing varies according to whether the wells are deeper than the Mission Canyon Formation.

Well spacing and density is established by requiring wells to be drilled in units based upon governmental sections. Vertical or directional oil wells projected to a depth not deeper than the Mission Canyon Formation must be drilled upon a governmental

²³⁶ OKLA. ADMIN. CODE § 165:10-3-28(c)(2)(B) (2017).

²³⁷ OKLA. ADMIN. CODE § 165:10-3-28(d)(2) (2017).

²³⁸ OKLA. ADMIN. CODE § 165:10-3-28(e) (2017).

²³⁹ ADMIN. CODE § 165:10-3-28(f)(1), (2) (2017) ("Unconventional reservoir" is defined as "a common source of supply that is a shale or a coal bed, or any other common source of supply designated as such by Commission order or rule.").

²⁴⁰ OKLA. ADMIN. CODE § 165:10-29-2 (2017).

²⁴¹ OKLA. ADMIN. CODE § 165:10-29-2(b)(2)(A) (2017).

²⁴² OKLA. ADMIN. CODE § 165:10-29-2(b)(2)(B) (2017).

²⁴³ N.D. CENT. CODE ANN. § 38-08-04 (West 2017).

²⁴⁴ N.D. CENT. CODE ANN. § 54-17-02 (West 2017).

quarter-quarter section (forty acres) and not less than 500 feet from the boundary line of the quarter-quarter section or equivalent lot.²⁴⁵ No more than one well may be drilled to the same pool in any such quarter-quarter section, nor any lot less than thirty-six acres, except by order of the Commission.²⁴⁶ If the vertical or directional oil well is projected to be deeper than the Mission Canyon Formation, the well must be drilled on a governmental quarter section lot (160 acres) and no less than 600 feet from the boundary of the quarter-quarter section or lot.²⁴⁷ No more than one well may be drilled deeper than the Mission Canyon Formation on a governmental quarter-quarter section lot or on any lot containing less than 145 acres, except by order of the Commission.²⁴⁸

Horizontal wells must be drilled in drilling units. Horizontal wells projected to a depth not deeper than the Mission Canyon formation must be drilled upon a drilling unit described as a governmental section (640 acres) or two adjacent governmental quarter sections (320 acres) within the same section, not less than 500 feet from the outside boundary of the tract.²⁴⁹ If the well is to be drilled deeper than the Mission Canyon formation, it must be drilled upon a drilling unit described as a governmental section (640 acres), not less than 500 feet to the outside boundary of the tract.²⁵⁰ The horizontal well must justify the creation of a drilling unit, a justification determined by the director's opinion.²⁵¹ No more than one well may be completed in the same pool on any such tract.²⁵²

Gas wells in North Dakota that are not deeper than the Mission Canyon formation must be drilled on governmental quarter section lots (160 acres/pp) no closer than 500 feet to the boundary of such quarter section.²⁵³ Gas wells to be drilled deeper than the Mission Canyon formation must be drilled upon

²⁴⁵ N.D. ADMIN. CODE § 43-02-03-18 (1)(a) (2017).

²⁴⁶ *Id.*

²⁴⁷ N.D. ADMIN. CODE § 43-02-02-18(1)(b).

²⁴⁸ *Id.*

²⁴⁹ N.D. ADMIN. CODE § 43-02-02-18(2)(a).

²⁵⁰ N.D. ADMIN. CODE § 43-02-02-18(2)(b).

²⁵¹ *Id.* at § (2)(a)–(b).

²⁵² *Id.*

²⁵³ N.D. ADMIN. CODE § 43-02-02-18(3)(a).

governmental quarter section lots (160 acres) and no closer than 660 feet to the boundary of such governmental quarter section.²⁵⁴ In the event that oil or gas is discovered in a pool not already covered by an order of the commission, a hearing will be held to establish temporary spacing for the pool, and after three years, a hearing will be held to determine the proper spacing for the pool.²⁵⁵ Any well drilled within one mile of an established field must conform to the spacing requirements in that field except when the well will not produce from the same common source of supply.²⁵⁶

D. Pennsylvania

When Pennsylvania's Oil and Gas Conservation law ("OGCL") was passed in 1961, jurisdiction was granted to the Oil and Gas Conservation Commission. However, in 1970 the Commission was abolished. Its functions were transferred to the Department for Environmental Resources, which is now known as the Department for Environmental Protection ("PADEP").²⁵⁷ The OGCL only applies to wells, which penetrate the Onondaga formation or 3,800 feet in depth in those areas where the Onondaga formation is deeper than 3,800 feet.²⁵⁸ Notably, the Marcellus Shale overlies the Onondaga formation and is not subject to the OGCL, which means that wells drilled into the Marcellus are not subject to spacing laws except for those wells penetrating workable coal beds, as discussed below, and where it lies deeper than 3,800 feet.²⁵⁹ Wells cannot, however, be drilled within 200 feet from a building or water well or within 100 feet of a spring, stream, body of water, or wetland larger than one acre, but the PADEP may grant a waiver.²⁶⁰

For wells that are subject to the OGCL, Pennsylvania imposes a requirement that in the absence of a voluntary unitization agreement, spacing, or pooling order previously issued

²⁵⁴ N.D. ADMIN. CODE § 43-02-02-18(3)(b).

²⁵⁵ N.D. ADMIN. CODE § 43-02-02-18(4).

²⁵⁶ *Id.*

²⁵⁷ 71 PA. CONS. STAT. § 510-103 (2017); 71 PA. CONS. STAT. § 1340.501 (2017).

²⁵⁸ 58 PA. CONS. STAT. § 403(b)(1) (2017).

²⁵⁹ *Id.*

²⁶⁰ 58 PA. STAT. AND CONS. STAT. § 3215 (West 2012)

by PADEP, a newly-permitted well location must be at least 330 feet from the nearest outside boundary of the lease on which it is located.²⁶¹ After one or more wells have been drilled that establish the existence of a pool, an application for a spacing order may be filed. Either the operator of the discovery well or the operator of lands directly and immediately affected by the drilling of the discovery well or subsequent wells may file.²⁶² Upon such an application, the PADEP is required to enter an order establishing well spacing and drilling units of a specified and an approximate uniform size and shape for each pool.²⁶³ The uniform size of the spacing units cannot be smaller than the maximum area that can efficiently and economically be drained by one well.²⁶⁴

Pennsylvania also imposes specific spacing requirements for gas wells to protect workable coal beds. Gas wells penetrating a workable coal seam (other than those penetrating the Onondaga formation) must be at least 1,000 feet from any other well.²⁶⁵ Furthermore, no permit for a gas well covered by the act which is intended to be part of a “well cluster” shall be issued, unless the well cluster is located not less than 2,000 feet from the nearest well cluster as measured from the center of the well bore to the nearest well.²⁶⁶ “Well cluster” is defined by the statutes as an area within a well pad intended to host multiple horizontal wells and which comprises an area no greater than 5,000 square feet.²⁶⁷ The spacing requirements of this section may be waived in writing between the applicant and the owner of the workable coal bed.²⁶⁸

VI. SHOULD KENTUCKY REVISIT SPACING REQUIREMENTS

Though not as wide open as Pennsylvania, Kentucky is a favorable environment for operators who are interested in drilling

²⁶¹ 58 PA. STAT. AND CONS. STAT. ANN. § 406 (West 2016).

²⁶² 58 PA. STAT. AND CONS. STAT. ANN. § 407 (West 2016).

²⁶³ *Id.* at (1).

²⁶⁴ *Id.* at (4).

²⁶⁵ 58 PA. STAT. AND CONS. STAT. ANN. § 507(a) (West 2016).

²⁶⁶ *Id.* at (d).

²⁶⁷ *Id.* at (f).

²⁶⁸ *Id.* at (a); *id.* at (d).

for and producing unconventional resources. Although there are certain provisions of the Kentucky Revised Statutes that could be amended to provide for more sensible regulation, Kentucky laws certainly allow more flexibility than the more complex requirements imposed in some of the states with large production. Kentucky, like several other states, was slow in adopting oil and gas conservation laws, but those laws have now been in effect since 1960 with few amendments.²⁶⁹

Although it is questionable whether some of the provisions were adopted for true conservation purposes, the laws do not differ substantially from those adopted by other states. Statewide “default” spacing distances vary widely. Kentucky requires a case-by-case hearing for determination of spacing for wells that are defined as “deep” wells, whether vertical or horizontal.²⁷⁰ While this approach might result in adoption of spacing requirements that more closely approximate actual drainage areas for each well, it is more burdensome than being able to rely on a statutory or regulatory number for permitting purposes.

Kentucky’s boundary line spacing requirements for non-deep wells appear to be consistent with those used in other states. For vertical wells, Oklahoma’s boundary line spacing requirements are more lenient than Kentucky’s with respect to shallow wells (165 feet) and approximately the same with respect to wells deeper than 2,500 feet (300 feet).²⁷¹ Like Kentucky, Pennsylvania requires 330 foot spacing from property lines but only for wells that penetrate the Onondaga formation or are at least 3,800 feet deep when the Onondaga formation is deeper than 3,800 feet.²⁷² Although the spacing laws of Texas were originally less restrictive, the statewide minimum boundary spacing requirement is now 467 feet.²⁷³ North Dakota’s boundary line spacing varies from 500 to 600 feet, depending on the formation penetrated by the well.²⁷⁴ Unlike some other states,

²⁶⁹ Nuttall, *supra* note 68.

²⁷⁰ KY. REV. STAT. ANN. § 353.570 (West 2017).

²⁷¹ *Compare* OKLA. ADMIN. CODE § 165:10-1-21 (2017), *with* KY. REV. STAT. ANN. § 352.510 (West 2017).

²⁷² *Compare* 58 PA. STAT. AND CONS. STAT. ANN. § 406 (West 2016), *with* KY. REV. STAT. ANN. § 352.510 (West 2017).

²⁷³ 16 TEX. ADMIN. CODE § 3.37 (2017).

²⁷⁴ N.D. ADMIN. CODE § 43-02-03-18 (1)(a) (2017).

Kentucky relies solely on spacing requirements to regulate well density, and does not require specific drilling units, except in the case of pooled wells, pursuant to KRS § 353.630, and deep wells.²⁷⁵

Consequently, there is no reason to conclude that Kentucky should adopt different boundary line spacing requirements for vertical wells. Although the boundary spacing distances of 200 feet for shallow wells in non-coal bearing strata, and 330 feet for other wells are arbitrarily applied to all formations,²⁷⁶ there is no indication that another number would be preferable. Kentucky's boundary spacing distances are not markedly different than those imposed by other states. Also, having specific numbers in place provides predictability for well operators and expedites the well permitting process, which otherwise could be held up while the permit-issuing authority determines the appropriate spacing. Furthermore, the spacing statute provides for a variance in the event the operator is able to obtain the written consent to adjoin oil and gas interest owners or if the director finds, after notice and hearing, that conditions are such as to make compliance with the spacing requirements unduly burdensome or in conflict with reasonably prudent methods and practices for the production of oil and gas. Finally, through the forced pooling process, the law allows wells to be drilled without consideration of the boundary line requirements in the case of locations that could not be drilled due to boundary line requirements.

Well-to-well spacing is more variable among states. In the other states examined, when an oil or gas discovery is made, well-to-well spacing is subject to an order of the applicable state commission. In the absence of an order of the Corporation Commission, Oklahoma's minimum well to well spacing is 300 feet for shallow wells (less than 2,500 feet deep) producing from the same formation, and 600 feet for deeper wells.²⁷⁷ Although Pennsylvania allows well-to-well spacing on a case-by-case basis for wells penetrating the Onondaga formation once a discovery has been made, wells on adjoining properties can be no closer

²⁷⁵ See KY. REV. STAT. ANN. § 353.630 (West 2017).

²⁷⁶ KY. REV. STAT. ANN. § 353.610 (West 2017).

²⁷⁷ OKLA. ADMIN. CODE § 165:10-1-21 (2017).

than 660 feet.²⁷⁸ North Dakota's minimum well spacing is at least 1,000 feet, based on the limitation of one well per unit and boundary line spacing and 1,200 feet for wells deeper than the Mission Canyon Formation.²⁷⁹ Texas requires that wells in the same formation on the same tract be 1,200 feet apart, but wells separated by boundary lines need only be 934 feet apart.²⁸⁰

Kentucky appears to fall somewhere in the middle. Pennsylvania has no well-to-well spacing for wells shallower than the Onondaga formation.²⁸¹ Kentucky's minimum well-to-well spacing is greater than Oklahoma's, but less than that of North Dakota and Texas.²⁸² Kentucky's deep well-to-well spacing requirements are similar to those imposed in some other states, although Kentucky does have the peculiar intermediate spacing requirement for wells between 6,000 and 7,000 feet deep. Although these distances are arbitrary, there is no real reason that Kentucky's well-to-well spacing should change, given that the option exists to seek different spacing under appropriate circumstances.

Boundary line and well-to-well spacing for horizontal wells is generally similar to spacing for vertical wells among the states. Although horizontal wells drain more oil and gas more quickly, there does not seem to be cause for concern of increased drainage from adjoining properties or harm to reservoirs from the faster drainage. With respect to wells less than 6,000 feet deep, Kentucky does not differentiate between horizontal and vertical wells for spacing purposes, and for wells greater than 6,000 feet deep, Kentucky will impose spacing for horizontal wells on a case-by-case basis. This should eventually lead to spacing requirements that more accurately reflect the actual drainage area of wells. It remains to be seen whether a statewide spacing rule would be more efficient for horizontal deep wells rather than a case-by-case hearing.

One provision of Kentucky's spacing laws that could be

²⁷⁸ See 58 PA. STAT. AND CONS. STAT. ANN. § 406 (West 2016).

²⁷⁹ See N.D. ADMIN. CODE § 43-02-03-18(1)(a).

²⁸⁰ 16 TEX. ADMIN. CODE § 3.37 (2017).

²⁸¹ See 58 PA. STAT. AND CONS. STAT. ANN. § 406 (West 2016).

²⁸² Compare KY. REV. STAT. ANN. § 353.610 (West 2017), with OKLA. ADMIN. CODE § 165:10-1-21 (2017) and N.D. ADMIN. CODE § 43-02-03-18(1)(a) and 16 TEX. ADMIN. CODE § 3.37 (2017).

improved is the requirement to maintain well-to-well spacing when drilling a horizontal well to enhance production in an old producing field, also known as “infill drilling”. Although it is possible to get a variance from this requirement by obtaining consent of adjacent landowners or with a hearing before the Division, such efforts appear impractical. As shown above, a single horizontal well is the equivalent of a straight line of vertical wells on infinitesimally small spacing. Since that is the case, there is no sound reason why a horizontal well would need to maintain 660 foot spacing from existing vertical wells in the same formation. Unless it is shown that such a well would cause significant drainage problems or result in damage to the reservoir, the law should be changed to allow such activities.

As demonstrated above, unconventional reservoirs would not be productive without hydraulic fracturing operations or similar technology because the oil or gas would not move toward the well in the absence of migratory pathways. Consequently, current well spacing requirements are essentially meaningless when applied to unconventional reservoirs. However, it would be impossible to base well spacing on the size of the fracture treatment, and it would be contrary to the principle of maximizing production to attempt to limit the size of a fracture treatment to stay within the bounds defined by well spacing requirements. As noted by the Texas Supreme Court in *Coastal Oil and Gas Corp. v. Garza Energy Trust*:

The Commission has never found it necessary to regulate hydraulic fracturing . . . , but should it ever choose to do so, permitting fracturing that extended beyond property lines, however reasonable in terms of industry operation, would be met with the objection that the Commission had allowed the minerals in the drained property to be confiscated.²⁸³

The court also noted, “hydraulic fracturing cannot be performed both to maximize reasonable commercial effectiveness

²⁸³ *Supra* note 187, at 14.

and to avoid all drainage. Some drainage is virtually unavoidable.”²⁸⁴ The court also noted that hydraulic fracturing is not optional in certain formations, like the Vicksburg T sandstone and the Barnett Shale, rather, it is essential to the recovery of oil and gas from these formations.²⁸⁵ However, the court noted that:

clues about the direction in which fractures are likely to run horizontally from the well may be derived from seismic and other data, but virtually nothing can be done to control that direction; the fractures will follow Mother Nature’s fault lines in the formation.²⁸⁶

The court added that estimates of the effective length and propped length are, at best, imprecise.²⁸⁷ Therefore, because of this uncertainty, well spacing cannot reliably be related to hydraulic fracturing in unconventional reservoirs, and any attempt to base well spacing or unit size for unconventional reservoirs on hydraulic fracturing would be in conflict with the goal to maximize recovery of oil and natural gas. With the almost simultaneous passage of the Kentucky Oil and Gas Regulatory Modernization Act and its new definition of “deep well” as those exceeding 6,000 feet, the Kentucky Oil and Gas Conservation Commission missed a key opportunity to simplify its deep well regulations by eliminating the delineation between vertical wells shallower and deeper than 7,000 feet. However, it appears this problem could easily be corrected.

Although Kentucky’s new deep well regulations will allow for more effective spacing for horizontal wells, the state is very likely to face a significant problem if or when deep drilling activity markedly increases. In other states, the entities responsible for approving deep well spacing and units are either administrative agencies (as in Pennsylvania) or commissions composed of well-compensated public officials (as in North Dakota, Oklahoma, and Texas). In Kentucky, this function is

²⁸⁴ *Id.* at 16.

²⁸⁵ *Id.*

²⁸⁶ *Id.* at 6.

²⁸⁷ *Id.* at 7.

performed by a board composed of volunteers who receive a relatively small per diem.²⁸⁸ If a deep horizontal well drilling boom develops in Kentucky, the state will likely be required to revisit its dependence on a volunteer board serving with limited compensation to decide questions related to permitting, spacing, and well density. Instead, such decisions should be made administratively by the permitted authority responsible for shallow wells or by a board composed of individuals who are adequately compensated to justify the extensive work that will be required.

VII. CONCLUSION

Although Kentucky was slow to adopt oil and gas conservation laws to prevent economic waste, it appears that significant strides have been made toward keeping up with advancements in technology that have opened vast new reserves across the United States. The current regulatory program is adequate for handling new wells drilled with these technologies as well as potential new discoveries. A drilling boom similar to the magnitude accompanying the development of the Barnett Shale, the Marcellus Shale, or the Bakken formation would, of course, put significant strain on Kentucky regulators, but the basic program is now in place to address such an event.

Some changes to the program would be desirable, including elimination or revision of spacing requirements for horizontal infill drilling, clarification to regulations to eliminate unnecessary distinctions in certain deep wells and changes that would create adequately compensated, full time positions for members of the Kentucky Oil and Gas Conservation Commission or delegate Commission authority to the Divisions of Oil and Gas. At this time, with limited new drilling due to depressed prices, the changes are not an emergency, but it is certainly better to have them in place before a boom occurs.

²⁸⁸ KY. REV. STAT. ANN. § 353.565 (West 2017).

