April 1994

Fire in the Hole to Longwall Shears: Old Law Applied to New Technology and Other Longwall Mining Issues

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FIRE IN THE HOLE TO LONGWALL SHEARS:
OLD LAW APPLIED TO NEW TECHNOLOGY AND
OTHER LONGWALL MINING ISSUES

J. THOMAS LANE*

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I. Introduction

A. The Setting

“Fire in the hole” was the cry of the raspy voiced miner: words of warning as well as relief. A warning that the powder would soon explode; relief that the drudgery of preparing the face was complete. Words which marked a brief respite from the heavy toil of lying on his side and working the undercut with a hand pick as far as his arm could reach. A respite from drilling with a hand auger for holes in which to place the powder.

It may have been his first hour on shift, yet perspiration soaked his underclothes and mixed with coal dust to form a black paste on
his face. In the brief rest waiting for the thump of the explosive, he imagined his pretty wife hanging clothes, her comely figure an enticing silhouette against the bright sunshine. A pleasant picture interrupted with the thought of the heaviest toil of all: picking up the shovel, working it across the jagged floor and, with little head room in the low coal, attempting to lift just the right weight of coal into his cart. A little light and the motion would be wasted. A little heavy and his back would scream in pain. A task made more difficult by the need to gather the large pieces and leave the fines which had little value.1

Firmly, he held the reins lest his horse spook at the ignition—a horse which lived in the mines and saw daylight only long enough to dump its cart into the coal hopper. The miner could reflect during this interlude that his work was hard and tiring. Many of his fellow workers were injured, some gruesomely with parts of their faces smashed under rockfalls or limbs severed. Several of the injuries occurred only inches from him, yet he was fortunate and escaped.

He could consider that his work was vastly improved by the use of dynamite to break the coal into pieces. The new technology of undercutting and blasting enabled him to increase his productivity greatly. By delivering more loads each day he could increase his income. There were drawbacks, of course, the blast from the powder might set off a mine fire. The concussion could loosen roof support and great tragedy could result. Part of the job, but surely greatly improved.

His thoughts were interrupted with the echo through the mine of his own words: "Fire in the hole," when a flash lit up the entire area and even his experienced horse bucked as the explosion ripped the coal off the face. Blinded temporarily by the flash and with ears ringing from the concussion, his only discomfort was the cool coal dust which fell through his shirt mixing with the perspiration on his back.

1. See Keith Dix, The Labor Process, in What's A Coal Miner To Do? 1, 5-7 (1988). In 2 George G. André, A Practical Treatise On Coal Mining 316 (1888), the author reports that the small coal or "slack" is "utterly worthless" and is either left in the mine or sold at a loss. Medium coal is sold at a small profit, and there should be "considerable profit" upon large coal.
The year: about 1900. Perhaps a scene from the movie "Matewan." That 1900 miner would be ecstatic to behold the chain saw undercutting machines and air drills of the 1920s and '30s. He would marvel at the mining machines of the 1940s and '50s, and he would be lucky to have a job working the continuous miners of the 1960s. Longwall shears and hydraulic shields of the 1980s and '90s—beyond comprehension.  

The work and labor of a coal miner in partial darkness and the cool damp air of an underground mine is commonly viewed as undesirable. Consider for a moment, however, the toils of a Texas hill country farmer in 1900. A man with pride, deep devotion to his family, and willing to work in the hot Texas sun from daybreak until night and barely scratch a living. With no irrigation in mostly arid soil, his entire life was filled with the uncertainty and supreme capriciousness of the weather, which varied from severe storms that washed away what little tillable soil he had to droughts which wasted the land.

This farmer would have been ecstatic to have 1940s fertilizer. He would have marveled at 1950s farm machinery and he would hardly have believed 1960s irrigation systems. Electricity and running water—beyond comprehension. This farmer could have been Sam Ealy Johnson, Sr., grandfather of Lyndon Johnson.  

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2. It appears that machinery to mine coal was developed as early as 1850; however, it was not widely used until after the mechanization of practically all other industries during the industrial revolution. For example, T. L. Carr reports in LONGWALL MINING IN GREAT BRITAIN I (undated), that the United States Commissioner for Mining reported in 1870 that "the proposition to substitute machines for manual labour in cutting coal was made . . . [in 1850] by Mr. Peace of Wigan (England). He invented a machine called the iron man, but it met with ridicule and contempt." One writer comments on this phenomenon: For more than a hundred years, from before the Civil War to well into the 1930s, the production of coal depended on the simple act of taking shovel in hand, scooping up a pile of the material and throwing it into an empty mine car. During the period that bituminous coal provided energy for the nation's industrial revolution, each year human muscle lifted nearly half a billion tons of coal, an average of three feet from ground to mine car. It is ironic that the advance in technology and management, which gave modern industry its momentum, bypassed the one industry on which most others depended. While a few mine owners experimented in the 1920s with ways to substitute mechanical for muscle power for loading coal, as late as 1948 a third of the nation's underground coal was still loaded by hand.  

Id.

Either man could have considered his past and present and surely both would have agreed with Daniel, as well as the judge, in *Ball v. Island Creek Coal Co.*, 4 that “knowledge [would] increase.” In all of American life we are fascinated, marvel at, and usually endorse modern technology and invention. Indeed our history, and an important part of our culture, is that American ingenuity can outdo anyone anywhere.

The American mining industry is only one example. Mine statistics on productivity and injuries during this century show an incredible increase in productivity per worker and a corresponding decrease in mining injuries. In the face of these radical improvements, it is sometimes incredible to read such publications as the *Charleston Gazette*, a newspaper with the largest circulation in the State of West Virginia, which for decades has caustically derided the coal industry as an unfit place to work, primarily because of the dangers of mining. Today, without mention of vastly improved working and safety conditions, it laments the decrease in the number of jobs existing in the coal industry almost as if it had never written articles decrying the existence of those jobs.

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5. For example, Ken Ward, Jr., *In Search of A Future*, CHARLESTON SUNDAY GAZETTE-MAIL, Feb. 13, 1994, at 1B, describes the plight of residents in West Virginia who formerly had jobs in the coal industry but whose future was uncertain because of the lack of the number of coal industry jobs. The antagonism of this newspaper to the coal industry is seen in a major subtopic of the article which describes the effort of the UMWA during the 1993 coal strike to secure union jobs at all operations of companies who were signatories to the 1988 union contract. The story recounts an incident occurring in the midst of the strike involving 500 miners who invaded Laidley Tower, a major office building in Charleston, where they “took over” the building and “occupied Peabody subsidiary Eastern Associated’s offices.” The “takeover” disrupted all of the businesses and firms located in the 18-story building, and under most circumstances, this act of “civil disobedience,” as charac-
This law review article was originally written in 1990 and submitted at the annual National Coal Lawyers Conference. Its title then was the “Legal Implications of Longwall Mining.” The article was written against the backdrop of several excellent articles relating to longwall mining, the constitutional issues pertaining to regulation, and subsidence issues which, in the absence of definitive court decisions on longwall mining, could only advance the issues and the arguments raised. In the interim, other excellent articles dealing with many of these “legal implications” have been written focusing upon waivers, effects of the Surface Mining Control and Reclamation Act, conflicts with oil and gas operations, and Illinois Subsidence Laws. More importantly, court decisions have been reached that resolve many of the issues raised in the early articles. This 1994 article will update the issues and focus particular attention on technology and an analysis of the principles that should apply when new technology is employed in the future in land development, and in particular, mining.

A brief glimpse of a miner, farmer, indeed any person in any walk of life, shows the remarkable changes in the past 100 years.

6. Patrick C. McGinley, Does the Right To Mine Coal Under Lease Or Deed Include the Right To Extract By Longwall Mining Methods?, 5 E. MIN. L. INST. ch. 5 (1984).
Surely we should anticipate that mining and other aspects of life in the next 25 years, 50 years, and 100 years will change just as remarkably as the past, perhaps more so.

Consider the possibility that computers could operate machines that will mine coal and even develop new mine areas without underground miners. Ponder whether new techniques can be developed to transport coal without belts, railcars, and similar devices. Consider also the possibility that other forms of energy will supplant coal as a power source and in some measure render mining obsolete. Within five years the publication of this Law Review in paper format may also be obsolete, replaced with a CD Rom disk or some form of online computer access.

Development of mechanized equipment for longwall mining is recognized to have occurred approximately 50 years ago, although development and experimentation to achieve efficient systems took many years after the first introduction. The real surge in use seems to have occurred from the early 1980s to the present, when an average 15% increase in use has occurred each year from at least 1983.

In the current era, longwall mining has played an important role in improving productivity, the safety of miners, and ultimately the competitiveness and profitability of mining. West Virginia, which ranked second among all states in 1992 in terms of total coal production, produced 163.8 million tons, 36.4 (or 22%) of which were attributable to longwall mining. The Appendices following this article

14. Trigg H. Combs, Longwall Census '92, COAL MAGAZINE.
15. For example, Trigg H. Combs reports in Longwall Census '92, COAL MAGAZINE, that productivity in tons per man shift increased from 136 tons in 1989 to 174 tons in 1990 with little increased labor.
16. Statistics maintained by the West Virginia Office of Miners' Health, Safety and Training show in graphic detail the increase in productivity which results from the mechanization of the mining industry during this century in West Virginia and the corresponding decrease in fatal injuries. See Appendix 1.
show the steady increase in tons produced by the longwall method in the recent past.8

Sources report that at least 27 coal companies were operating up to 95 longwall systems in 11 states in 1989 and 1992.19 Fortunately, with the increase in longwall production there is a marked decrease in the number of injuries.20 Thus, while longwall mining accounted for 22% of the coal mined in West Virginia in 1989 it resulted in only 1.8% of mining injuries.

B. Description of Longwall Mining

Perhaps no discussion on this topic is complete without a description of longwall mining—at least none of the reported cases or articles have made such an attempt. In Porter v. Consolidation Coal Co., Judge Barron McCune states succinctly:

Longwall mining is a mining technique by which coal is removed without leaving pillars to support the mine roof. The mine roof is held up by self advancing hydraulic supports that progress forward with the cutting equipment, allowing the roof to collapse behind the supports. Conversely, the room and pillar or conventional mining method results in the development of a room and pillar configuration.21

In an excellent article relating to longwall mining, Joshua I. Barrett describes the effects of longwall mining as follows:

Modern longwall mining is an underground mining technique which removes coal from a "panel" which may be from 400 to 1000 feet along the face and from 1,000 to over 10,000 feet long. The coal seams mined by this method must be relatively level and range from 40 to 180 inches in seam height. It is a highly mechanized system, typically consisting of three principal components: a shearer or plow, which cuts the coal as it

18. See Appendices 2 and 3.
19. See Appendix 4 for a summary of the state rankings.
20. See Appendix 5 for a summary of the statistics reported for the decrease in injuries in West Virginia.
moves across the face; a chain-type armored face conveyor to remove the coal from the face; and a system of self advancing hydraulic roof supports, usually chocks or shields, which support the roof as the shearer makes its cut and then allow the roof to collapse behind the mining. In the United States, longwall mining is the retreating type; the longwall panels are situated between development sections or panel entries consisting of a row or rows of chain pillars, laid out parallel to the main entries, which allow access and ventilation to the panel and define its dimensions.

The difficulty with longwall mining is that, as practiced in the United States today, it causes subsidence of the surface overlying and in the vicinity of the panel, and often results in loss of or damage to natural water sources.

Longwall mine subsidence effects vary to some degree from mine to mine, depending on the topography and lithography, the thickness and depth of the coal, and the dimensions of the panels. The removal of the coal and collapse of the roof in the longwall mining process disturbs the overburden strata, which deform and fail. Surface subsidence extends laterally so that areas not directly over the panels will nevertheless be within the “angle of draw” affected by subsidence. The progress of the mining as it moves through the panel also creates a wave effect ahead of the mining, within an “angle of advance influence.” In addition, there are powerful surface stresses along the edges of the panel which are more destructive than those in the center, and are most associated with damages to overlying structures; these areas are sometimes identified as being within an “angle of critical deformation.”

The strata overlying the mining will experience different fracturing patterns depending on their depth, so that areas immediately above the coal seam will experience the most severe disruption but seams higher up may be less affected. These overburden strata are categorized, in ascending order, as the caved zone, the fractured zone, and the continuous deformation zone. Each zone is associated with different subsidence characteristics, especially those relating to disruption of aquifers. The effects in any given case, however, must be examined not solely by reference to zones, but by more complex factors such as the topography overlying the mine, the composition of the strata, and the manner in which mining is conducted, as well as the height and lateral dimensions of the mining. 22

None of the definitions in the legal cases or articles omit the statement that longwall mining involves “removal of support” and allows the “collapse” or “subsidence” of the overlying strata, or at least words and phrases to that effect. Herein lies the reason for many prac-

tical problems to surface and other owners of the land, to regulation by the state, and for legal issues which both create. In *Culp v. Consol Pennsylvania Coal Co.*, the court notes, however, that:

In both room and pillar and longwall mining, the end result (i.e., subsidence) is the same, although it occurs sooner and more uniformly and predictably with longwall method. Longwalling is universally recognized as preferable, because it is safer, more economical, and predictable.

In most cases, longwall mining by definition affects the surface and all strata between the coal seam being mined and the surface, including other coal seams, water bearing formations, and other substances. Additionally, the size of longwall panels and the inability to make alterations to the configuration of the panels can cause special problems with regard to development of other substances below the coal, particularly the oil and gas.

**C. History of Longwall Mining**

The development of modern machinery and the dramatic increase in longwall mining lead many, perhaps, to the conclusion that longwall mining is a new technology. Indeed, practically all challenges to longwall mining include the allegation that parties to severance deeds and other instruments beginning in the 1870s and for many years later could not have contemplated a methodology for this type of full seam extraction and the certainty of the resulting subsidence.

The history books teach a different lesson. For example, Cedric E. Gregory reports: “In order to avoid the wastefulness of the room and pillar system, the longwall method was introduced into the Shropshire coalfields of Britain in 1770.”

Reports of early mining in the United States are laced with similar accounts, exemplified by the following from 1874:

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24. *Id.* at *8.
All the shafts at Braidwood, except one, are operated by the systems known as “long wall advancing,” extracting all the coal, except a sufficient pillar to support the bottom of the shafts. The exception is that owned by J.Q.A. King, and is worked in “panels,” by “long wall retreating.”

And also from 1874: “There are two general systems practiced in working out coal, termed respectively the ‘long-wall system,’ and the ‘pillar and room system.’ Each of these modes are varied to suit circumstances.”

The above reports were submitted to and relied upon by the district court in *Culp v. Consol Pennsylvania Coal Co.*, where the court reached the conclusion “that any argument that longwall mining was a novelty in this country in the early 1970s is totally baseless.”

These and other reports on coal mining near the turn of the century report two common forms of underground mining methods: the longwall method and the room and pillar method. Interestingly, these reports also state that surface mining was commonly recognized as a mining method in the 1920s.

The early reports on longwall mining show its extensive use in Europe, and while it was evaluated as a desirable method in this country, it did not receive the same acceptance. At least one writer con-

30. For example, Moore, *supra* note 29, reports: “In areas where a good seam of coal underlies a thin overburden it pays to strip off the covering. The depth to which this stripping may be profitably carried depends upon many factors. It has been considered in the past that a foot of overburden could be removed by hand for each foot of coal obtained. Most stripping is done at the present day [1922], however, by the large steam shovel of ordinary type, the rotary shovel or the dry glide excavator.” *Id.* at 264.
cludes that the reason was a lack of dependable market and work force:

Successful long-wall mining depended on uninterrupted production schedules, a condition difficult to achieve in the early days of mining. The failure to maintain regularity in the removal of coal often caused the roof to shear at the face, possibly resulting in a loss of equipment and inevitably incurring a considerable cost to reestablish the working face. Since the availability of steady customers and the regular delivery of empty railroad cars affected production schedules, mine owners were reluctant to commit their mines to the long-wall system. Work stoppages, which were frequent in some coal fields, interrupted production and intended, thereby, to discourage the adoption of this system. The mining official cited above noted that “even a short stoppage of operation may result in serious damage to the working area through the caving of the roof, in the pillar method this is less important.”

Thus, while long-wall mining made supervision of the work force possible, it also gave workers a strategic bargaining advantage not available to them in room and pillar mining.

The economic feasibility of longwall mining depended, therefore, on a risk-free market and on the availability of a peaceful and disciplined work force. Neither condition prevailed during the hand-loading period in this country.31

All of these early reports on underground mining show the recognition that both types of underground mining will result in subsidence. With room and pillar mining, efforts were generally undertaken to “pull” the pillars upon retreating from an area. It was recognized as dangerous work, and of necessity, resulted in subsidence. It was also recognized in these reports that in some cases where pillars were left, the pillars, as well as mine roof and floor, were subject to deterioration, so that over time there could be subsidence even where support was left. In these cases, subsidence is not predictable in its timing or scope and is always uneven when it occurs. Professor McGinley, however, correctly notes that with properly designed pillar support, damage to the surface and structures can be minimized.32

31. Dix, supra note 1, at 4, 5.
32. McGinley, supra note 6, at 5-8 (citing SYD S. PENG & HAN SHING CHIANG, LONGWALL MINING (1984)).
In many older cases dealing with subsidence and waivers of damages, most involved the room and pillar mining method. Longwall mining, however, was involved in the English decision of *Butterley Co., Ltd. v. New Hucknall Colliery Co., Ltd.*,\(^{33}\) where it was recognized that longwall mining would of necessity result in subsidence of an upper seam, but the court held that the lower seam lessee by implication could mine without regard to subsidence. The *Butterley* case, and importantly the provisions regarding longwall mining, were cited approvingly by the West Virginia court in *Continental Coal Co. v. Connellsville By-Product Coal Co.*\(^{34}\)

In one of the most cited West Virginia cases dealing with the problem of subsidence, *Griffin v. Fairmont Coal Co.*,\(^{35}\) the dissenting opinion in this early case notes that 'long wall workings' . . . was a mode of working which would completely extract, if it were followed, the whole of the coal without leaving any support whatever, except such limited support as might arise by rubbish left in the mine.\(^{36}\)

Thus, history shows that longwall mining is a technology which has been in existence for a long time, and for just as long, the legal implications of longwall mining have been recognized in court decisions.

II. LONGWALL MINING AS AN IMPLIED MINING RIGHT

A. Mining Rights Generally

In the eastern states, severances of ownership of minerals with the surface began in the mid-1800s. Such severances soon followed in the western states. Universally, the courts of all states adopted the rule that when severed title exists, the owner of the mineral estate will be deemed to have all rights that are reasonable and necessary to mine and enjoy the separate mineral estate, even if express rights to mine the minerals are absent. Such rights are implied, and together with any

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34. 138 S.E. 737, 742-43 (W. Va. 1927).
35. 53 S.E. 24 (W. Va. 1905).
36. Id. at 70.
rights which are expressed in a severance deed or other grant, are appurtenant to the mineral ownership.

Included are the rights to use the surface for access to the minerals, to mine, to process, to transport, and to exercise any other rights that qualify as reasonable and necessary.37 Such rights do not include, however, the right to damage or destroy the surface in an unreasonable or unnecessary way.

Debate exists over the basis for such rights.38 However, it seems most logical that implied rights are akin to ways of necessity. Whatever the basis, however, it is clear that in the absence of express mining rights in a severance deed, or perhaps in addition to those which are expressed, a mineral owner is deemed to have implied rights.

What is implied in a given situation requires further examination of the simple rule that the rights sought to be exercised must be both necessary and reasonable—a two-prong analysis. Looking first to what is “necessary,” cases such as Squires v. Lafferty39 establish that the question is not one of absolute necessity because in that case, and others like it, the right that the mineral owner sought to exercise was the ability to prospect for minerals. Clearly, the exercise of this right was not absolutely necessary to extract the minerals. Rather, this right was, as the court stated, “reasonably necessary,” and as such, the right to prospect was held to be implied. As to the second prong of the test—“reasonableness”—the inquiry focuses on the owner of the affected land and the question becomes whether the exercise of the right will cause a substantial injury or burden. For example, in Buffalo Mining Co. v. Martin,40 the question was whether the mineral owner could construct power lines over the surface to serve ventilation equipment. According to the court, in order for an implied right to exist “it must be demonstrated not only that the right is reasonably necessary for the extraction of the mineral, but also that the right can be exercised without any substantial burden to the surface owner.”41 In the

38. Bolen, supra note 11.
39. 121 S.E. 90 (W. Va. 1924).
40. 267 S.E.2d 721 (W. Va. 1980).
41. Id. at 725-26 (emphasis added).
Buffalo Mining case, the severance deed included broad mining rights, although not explicitly providing for electric power lines, and the court emphasized that where an effort is made to express broad rights in the severance deed, "courts will be inclined to imply compatible surface uses that are necessary to the underground mining activity."\(^{42}\)

Obviously, the reasonable and necessary rule is somewhat imprecise, and in close cases, will require a balance between the need of the mineral owner (is it "necessary") against the burden on the surface owner (is it "substantial").

The rules relating to implied mining rights are complicated by introduction of a relatively new rule of accommodation or alternate means. By whatever name, this rule dictates that each owner of property must exercise "due regard" for other owners in the same property.\(^{43}\) Under this rule, the exercise of a right, which clearly passes in the abstract the 'reasonable and necessary' test, becomes unreasonable under the particular facts. The decision most frequently cited for this rule, Getty Oil Co. v. Jones,\(^{44}\) exemplifies the problem. In that case, a farmer's irrigation system employed a series of pipes and mechanisms which moved across the surface at approximately seven feet above the surface. Getty, in the exercise of its clear right to drill and produce oil, installed two pumping jacks, one protruding 17 feet and the other 34 feet above the surface. The pump jacks interfered with the irrigation system, and the court considered the fact that other operators constructed their pump jacks below the surface so that no interference occurred and that they did so at a modest increased cost. Upon these facts, the Getty court adopted the rule that when the exercise of a right by one owner will interfere with another owner's use in the same land, and a reasonable alternative exists which will not interfere, then in such case a duty arises to use the "alternative." Expressed another way, a duty arises to "accommodate" or exercise "due regard."

These rules, perhaps concisely stated, constitute the common law principles on implied mining rights. While not employed in the same

\(^{42}\) Id. at 725.
\(^{43}\) Bolen, supra note 11.
\(^{44}\) 470 S.W.2d 618 (Tex. 1971).
words in every case, it is submitted that most situations are and can be tested within this basic framework.

B. Principles of Subsidence

With respect to subsidence, the early cases established that the surface and upper strata owners have the absolute right to have their property supported, unless such right is waived, either expressly or by necessary implication in a severance deed or other instrument. This principle is considered to be based upon one of two propositions: (1) an implied reservation to the surface owner of enough coal for support; or (2) the principle expressed in the maxim: "Sic utere tuo ut alienum non laedas," meaning, use your property so as not to injure the property of another. The West Virginia court has held that the latter doctrine is the basis for the right of support in West Virginia. Under this doctrine, it seems that a surface owner does not have an unqualified right to have the surface supported in its natural state, but rather, he has the right not to be unreasonably damaged. The right of support is viewed as being absolute from the standpoint that if material damage results, and no waiver exists, there is absolute or strict liability if the damage proximately results from the removal of support.

Whatever the basis, the general rule of support is universally recognized. While not employed in so many words in the cases, the reasonable and necessary test would reach the same result. Thus, if the question were raised of whether a coal owner has an implied right to


46. Griffin, 53 S.E. at 31 (Cox, J., concurring); see also, Gresham, supra note 9, at 914-15. In Pennsylvania, the right has been recognized to be the subject of separate ownership. Charnetski v. Miner's Mills Coal Mining Co., 113 A. 683 (Pa. 1921). In Erwin v. Bethlehem Steel Corp., 62 S.E.2d 337 (W. Va. 1950), the court held that an attempted reservation of a waiver of the support right in favor of a stranger to the deed was void, and in doing so, implicitly held that the grantor could not have reserved the right to himself as a separate estate. Id. at 342-46.

remove support and subside, the answer would lie in an analysis whether the right is both necessary and reasonable. The question of necessity is probably met by the fact that removal of support is necessary in order to mine all of the coal. The question whether it is “reasonable” depends on whether the surface owner, as stated by the court in Buffalo Mining Co., would be “substantially” burdened or injured. An affirmative answer would indicate that the right does not exist, and conversely, a negative answer should indicate that the right does exist. Indeed, this is the result reached by the Virginia court in Large v. Clinchfield Coal Co., where a determination was made that subsidence would not cause appreciable damage to the surface, and thus, the ability to mine without leaving support was held to be implied.

C. The Surface Mining Cases

The early cases on mining rarely dealt with particular mining methods or technology, but rather the effect or burden of the mining, particularly on the surface. With the advent of the surface mining cases, however, mining methodology became the focal point. In practically all cases involving surface mining, the decisions of the courts are based on the finding that this mining method virtually destroys the surface affected. Upon this finding, the courts generally have ruled that the surface mining method cannot be employed unless expressly granted. In practically all of these cases, the argument was advanced and often adopted by the courts that parties to severance deeds before the advent of surface mining could not have contemplated the surface mining method, ergo such mining method was not implied with the mineral ownership.

D. Contemplation of the Parties

It may be tempting to conclude from the surface mining cases that a new principle emerged whereby use of new methodology, indeed even new technology, is measured by the contemplation of the parties at the time of contracting or executing severance deeds.\textsuperscript{50} Indeed, great emphasis can be placed upon language in cases such as \textit{West Virginia-Pittsburgh Coal Co. v. Strong},\textsuperscript{51} where the court held, among other points, that because surface mining was not a known mining method in Brooke County, West Virginia, in 1904, it was not within the contemplation of the parties when they drafted the severance deed in question.

Stopping the analysis at this point, and concluding that the right to surface mine or exercise any other mining right does not exist because not contemplated, misses the real reason and justification for these decisions. The underlying basis for the \textit{Strong} case, and others like it, starts with the fact that the mining right in question (surface mining) was not expressly created, and the issue was whether it would be deemed implied with mineral ownership. The real basis for the decision that it is not an implied right is that the exercise of this right substantially injures the surface.

In one of the most recent cases on this subject, the Kentucky court in \textit{Ward v. Harding}\textsuperscript{52} considered a 1988 constitutional amendment on this topic, and held with respect to surface mining under Kentucky broad form deeds that

\begin{quote}
[properly framed, the question here is not what the parties actually intended, but what they would have intended if significant surface destruction had been contemplated. In circumstances where there is no actual intent, a court should presume a reasonable intent.\textsuperscript{53}
\end{quote}

\textsuperscript{50} Dissenting in \textit{Buffalo Mining Co. v. Martin}, 267 S.Ed.2d 721, 726 (W. Va. 1980), Justice Harshbarger states that this principle was adopted in the surface mining cases as a general proposition for all mining right issues and complains that the decision in \textit{Buffalo Mining Co.} negates this proposition.

\textsuperscript{51} 42 S.E.2d 46 (W. Va. 1947).

\textsuperscript{52} 860 S.W.2d 280 (Ky. 1993).

\textsuperscript{53} \textit{Id.} at 287.
The court properly held that the inquiry was not the mining technology and whether the parties could have contemplated surface mining, but rather, whether the parties contemplated a substantial destruction of the surface.

Perhaps without so stating, the courts in all of the surface mining cases have employed the reasonable and necessary test and balanced the "need" of the mineral owner against the "burden" on the surface owner. Thus, while it may be absolutely "necessary" for a mineral owner to use surface mining to extract surface coal, the universal conclusion has been that the substantial injury it would impose on the surface owner makes surface mining unreasonable, and therefore, not an implied right.

An important extension of the surface mining cases is the ultimate question whether surface mining can take place. On this point, the cases vary—even within states. In states such as West Virginia, Ohio, and Pennsylvania, surface mining, if not deemed to exist, may not be employed. Indeed, in some cases the courts adopted a more radical approach in holding that minerals, which could only be mined by surface mining, were not owned by the "mineral" owner but rather the surface owner. In other cases, the courts have held that surface mining is not an implied right in the sense that it can be employed without payment of damages. In these cases, the mineral owner has been allowed to proceed with surface mining but must pay damages. Some states have even adopted several of these approaches.


E. Longwall Mining Where Waivers Exist

The increased use in the longwall method of mining has ushered to the forefront an examination of many legal principles relating to mining rights. The stimulus in many cases is the fact that longwall mining results in subsidence, and in some cases, can cause substantial injury. The surface mining cases and the arguments advanced in them have provided the basis upon which recent challenges have been made to the use of longwall mining.\(^5^6\)

The recent cases considering longwall mining and the effect of waivers have generally concluded that if a waiver of damages for injuries resulting from underground mining exists, then the waiver remains valid and includes subsidence damage regardless of whether longwall or any other type of mining method is employed.\(^5^7\)

1. Contemplation of the Parties

In virtually all of the surface mining cases and all challenges to the right to conduct longwall operations, the assertion has been made that longwall mining as known today could not have been contemplated by the parties to severance deeds which were executed a long time ago. For the reason that it could not have been contemplated, it is argued that longwall mining is not an implied mining right.

As the argument goes, parties to deeds around the turn of the century were familiar only with pick and shovel mining, certain blasting techniques, and mules to haul the coal—in essence our 1900 miner. Just as these parties could not have contemplated D-9 dozers to surface mine, they could not contemplate the machinery that enables longwall mining today. Much solace could be obtained from such

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56. With great prescience, Professor McGinley accurately summarized these arguments in his 1984 article on the topic of longwall mining. See McGinley, supra note 6.
cases as *Lowe v. Guyan Eagle Coals, Inc.*,\(^{58}\) where the West Virginia court, employing singularly shallow thinking, indicated that use of modern technology in the form of coal trucks might not be permitted on a coal haulroad granted in 1902 because the trucks might "burden the servient estate to a greater extent than was contemplated at the time of the grant."\(^{59}\)

Consideration of this argument has met with nearly universal rejection in the longwall mining cases. The general purport of the decisions has been that mining technology and contemplation of the particular mining method is irrelevant. Instead, concern has focused on the effects of the mining by whatever method. Thus, where mining results in subsidence, consideration has been limited to the question of whether subsidence and the resulting damage were considered by the parties to the severance instrument.

In *Porter v. Consolidation Coal Co.*,\(^{60}\) the court readily dismissed the argument that longwall mining was not contemplated in holding that the issue was the plain meaning of the deed in question, which provided for a waiver of "damages that might arise from the removal of all of said coal without leaving support for the land above the coal . . . ."\(^{61}\) Upon further finding that the language of the deed contained no restriction against longwall mining or any other method, the court granted summary judgment for the coal company.

In *Wells v. American Electric Power Co.*,\(^{62}\) the court considered the intent of the parties to an 1874 severance deed in waiving damages resulting from underground mining. The court concluded that "it is difficult to conceive of any kind of damage being done to the surface except through subsidence . . . . [T]he language of the deed which waives 'all damages in any manner arising' must have been intended by the parties to include [this] most likely source of damage."\(^{63}\) The fact that longwall mining was employed was deemed irrelevant.

\(^{58}\) 273 S.E.2d 91 (W. Va. 1980).
\(^{59}\) Id. at 93.
\(^{61}\) Id. at *16.
\(^{63}\) Id. at 999.
The Wells court held that at the time of the severance deed, technology was available to remove so much of the coal that subsidence would occur. In waiving damages resulting from underground mining, the court found that the waiver included subsidence damage, and the longwall mining method was “only relevant . . . to the extent that it contributes to subsidence.”64 What the parties “contemplated,” held the court, was subsidence.

In Culp v. Consol Pennsylvania Coal Co.,65 the court held that the “argument that the severance deeds did not contemplate longwall mining, even if it were true, is wholly irrelevant under Pennsylvania law, which requires that contractual language must be given its plain meaning.”66 Central to this decision was the finding that the parties clearly waived support rights and damages for subsidence. Having done so, the court held that the challenge based upon mining technology was a “red herring” and the only real issue was the substantive effect of the mining subsidence.

In Ball v. Island Creek Coal Co.,67 the court assumed, for purposes of summary judgment, that the parties could not have contemplated longwall mining; however, the court determined that “whether the parties to a deed . . . contemplated the use of a particular underground mining technique is irrelevant in regards to the permissibility of the use of that technique.”68 What was relevant, the court held, was whether a “deed clearly waives the surface owner’s right to subjacent support in regard to underground coal mining in which case Virginia law would allow the use of longwall mining or any other underground mining technique by the mineral owner, even if such technique was not specifically contemplated by the parties to the deed at the time of its execution.”69

64. Id.
66. Id. at *8.
68. Id. at 1373.
69. Id. at 1374.
In *Smerdell v. Consolidation Coal Co.*, the plaintiff landowner cast the question in terms of changed circumstances and argued that the parties to a 1905 severance deed did not contemplate the changes in technology that resulted in longwall mining, thereby creating the damages in question. The federal district court found that the controlling issue was the “language of the 1905 deed,” which was “so clear and unambiguous that the owner of the surface could only have intended to waive the right to subjacent support [by] whatever method of coal removal was employed.”

The only decision to date holding that the peculiar effects of longwall mining were beyond a severance deed waiver is *Phillips v. Old Ben Coal Co.* In that case, the court held that a 1912 waiver did not extend to longwall mining methods because of the “certainty of subsidence,” which “would be imposing upon the grantor of the waiver a far greater burden than he originally bargained for.” The court hinged its decision on the fact that the parties, in waiving subsidence damages, did not contemplate a mining method whereby subsidence and the resulting damage would be certain. In doing so, the court suggested that the language of the waiver “must clearly and unequivocally demonstrate that the definite and certain subsidence is contemplated . . . .” This language of the opinion will certainly send chills to the drafters of instruments who have clearly provided for waivers of support and the resulting damage for removal, and who may find themselves in a position where they have left out the words that the removal of support might be “certain.” It is interesting to note that the opinion in this case was vacated, the appeal dismissed, and the opinion not included in the Northeastern Reporter.

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71. *Id.* at 1283.
73. *Id.* at *4.
74. *Id.*
2. New Technology

In considering the “contemplation” argument, several of the courts in the above decisions considered the use of new technology. In contrast to the limited logic applied in *Lowe v. Guyan Eagle Coal Co.* by the West Virginia court, these courts held that new technology was clearly permissible. In *Ball Island Creek Coal Co.*, the court stated that “[i]n 1908, as today, the parties knew that ‘knowledge [would] increase,’ see Daniel 12:4, and that better mining techniques would become available. An owner of mineral rights should be allowed to take advantage of modern technology subject to the terms of the deed.”

In *Ball*, the federal court applied Virginia law in holding that modern technology might be different than the technology existing at an earlier date; however, the difference was one of degree, not difference in kind. Thus, if subsidence occurs from pulling pillars, which was common over 100 years ago, or longwall mining, common today, the result is the same. This same logic was applied by the Virginia court with respect to surface development and use of rights of way in *Cushman Virginia Corp. v. Barnes.*

3. Distinction With Surface Mining

A companion argument to challenges to longwall mining has been that surface destruction is involved just as with surface mining, and accordingly, any mining technology that results in surface destruction should not be permitted unless expressly granted. In answer to this argument, the courts again have uniformly rejected it in finding that the subsidence effects of longwall mining are different than surface mining, and where surface mining rights must be expressly granted, the same is not the case with longwall mining.

76. 129 S.E.2d 633 (Va. 1963).
Virginia and Pennsylvania provide good case studies. In *Phipps v. Leftwich*, the Virginia court considered a severance deed that contained a waiver of damages for subsidence to the surface. Attempting to conduct surface mining, the coal operator argued that this waiver applied to any mining method which could disturb the surface, including surface mining. The court rejected this argument and held that the waiver did not apply to a wholesale destruction of the surface. The same result was reached in Pennsylvania in *Merrill v. Manufacturers Light & Heat Co.* In both states, the waiver was held to be limited to underground mining, and surface mining was not permitted.

When similar arguments were advanced in both states with respect to longwall mining, the federal courts held that the surface effects of longwall mining were substantially different than surface mining. In these cases, the courts held that the central issue was the effect of mining, not the method, and readily concluded that longwall mining was permitted in view of the clear waivers of subjacent support. The conclusion of the courts on this point is bolstered by the language of the Surface Mining Control and Reclamation Act and its state counterparts, which provide that there exists a "distinct difference between surface coal mines and underground coal mines." The conclusion of the courts on this point is bolstered by the language of the Surface Mining Control and Reclamation Act and its state counterparts, which provide that there exists a "distinct difference between surface coal mines and underground coal mines."  

### F. Longwall Mining With No Waiver

Clearly one of the most significant of the longwall mining cases comes from Virginia in *Large v. Clinchfield Coal Co.*, where the court considered a situation where no waiver existed for removal of support and no express grant was made for longwall mining. The land in question was "unimproved and uninhabited timberland in a mountainous area." Clinchfield employed the longwall method, and the

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77. 222 S.E.2d 536 (Va. 1976).
78. 185 A.2d 573 (Pa. 1962).
82. 387 S.E.2d 783 (Va. 1990).
83. *Id.* at 784.
surface owners sued, obtaining a judgment that longwall mining could not be used.

Significant to the Virginia Supreme Court was the factual finding that “there would not be any appreciable damage to the surface resulting from Clinchfield’s longwall mining.” The mine in question was 500 to 900 feet below the plaintiff's property, and the subsidence was found to cause fracturing of the strata for a distance of 150 feet above the seam. From this point to the surface, the strata “bows.” No surface cracks existed, and there was “uniform subsidence in the form of a swale above the excavated area, with a maximum depth of approximately three feet.”

Based upon these facts, the court held that “a claim for a violation of subjacent support is implicitly premised upon a showing of appreciable damage to the surface estate or diminution in its use.” Without showing “physical damage to their property, any interference with its use, or anticipated irreparable harm,” the court held the surface owners were not entitled to damages or an injunction.

One of the most important aspects of the decision was recognition by the court of the type of subsidence that results from longwall mining. In essence, the court found that the difference before and after mining would be a uniform lowering of the elevation by 3 feet and that this did not constitute damage sufficient to prevent longwall mining.

While not discussed by the court, it is submitted that the result is consistent with the reasonable and necessary rule. Mining, longwall included, is “necessary” to enjoy the minerals, thus, the first aspect of the rule is satisfied. Whether longwall mining is a “reasonable” method is answered by balancing the need of the coal owner to employ the most efficient method to extract a valuable resource against the damage to the surface. In Clinchfield, the fact that no appreciable damage

84. Id. at 785.
85. Id.
86. Id. at 785-86.
87. Id. at 786.
would result causes the balance to tilt to the coal owner. So analyzed, *Clinchfield* is good law.

**G. Longwall Mining Under Coal Leases**

None of the recent cases involve disputes between lessors and lessees under coal leases. Older cases establish that in a lease context, the same general principles apply. The starting point for analysis is the literal language of the lease. Absent language in the lease to the contrary, a lessee generally has a duty not to waste any part of the land and to leave the residue in good condition for development by the lessor-owner after termination of the lease. A lessee who mines coal in a way that damages upper seams or the surface is subject to injunctive action against mining in such manner and to damages for any coal wasted or other injury to the land. In *Butterley Co., Ltd. v. New Hucknall Colliery Co., Ltd.*, a different result obtained where an implied waiver of support was found to exist. That case involved two lessees from a common lessor, with one lessee having an upper seam and the other a lower seam. The lower seam lessee employed longwall mining causing subsidence of the upper seam, and the court held that an implied waiver gave the lower seam lessee the right to do so.

In *Lenox Coal Co. v. Duncan-Spangler Coal Co.*, under similar facts, but without a clear waiver, an upper seam lessee obtained an injunction against removal of support by a lower seam lessee, despite provisions in the upper seam lease that there would be removal of pillars in the lower seam. Interestingly, a similar result under similar facts involving the same defendant was reached in *Pennsylvania Coal & Coke Corp. v. Duncan-Spangler Coal Co.*

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Most coal leases require the lessee to submit its mine plans to the lessor on a periodic basis. These plans generally will show whether support is being removed, particularly where longwall mining is used. Approval of these plans, or at least failure to object, constitutes a safeguard to the lessee who is removing support against claims by the lessor.92

H. Rules For New Technology

The fundamental issue addressed by the courts in the longwall mining cases is the question of whether new technology can be employed in the use of land where the rights of the respective owners were created prior to the existence of the technology. In essence, the mining rights in these cases are akin to other forms of easements,93 and the end result of the longwall cases is the same as that reached in similar cases involving easements generally.

The seminal decision on this seems to be *Luttrell's Case,*94 where the court held that the use of a water course could be changed from serving a "fulling mill" to a "grist mill" because the use of the water course was not changed. In a case rich in citations to similar precedent, the Oregon court95 notes that the English as well as American decisions expanded on the principle of *Luttrell's* case, so that the universal rule is that the owner of an easement (or mining right) has the right to "avail himself of modern improvements which will enable him to enjoy more fully the rights which were granted."96 In the Oregon case, the court allowed the owner of an easement to change the use from a railroad line to haul timber to a truck logging road in order to avail the owner of the easement the use of trucks as a modern technology. The limitation on the rule is that the use cannot be a greater burden on the servient estate in the sense that the use is "an additional or different servitude" or a "change . . . material either in the nature

92. Douglas, *Rights of Owners,* supra note 91, at Ch. 4.06.
96. Id. at 349. 
or quantum of the servitude imposed." Modern technology has been held to apply to statutory easements, as for example, in *Watson v. Brady* where the modern technology of an "electric interurban railroad" was permitted on a railroad line.

In a case that could just as easily be applied to the Texas hill country farmer sometime after 1900, the West Virginia court considered a situation where a tract of 104 acres in 1884 was carved out of a larger tract, and for access to it, the grantor included a "right of way for the benefit of the land hereby conveyed." In 1918, the parties litigated whether the right of way could be used for the new technology of telephone lines, and the court held that:

[W]here a right of way is granted or reserved without limit of use it may be used for any purpose to which the land accommodated thereby may naturally and reasonably be devoted. And anciently it was decided in England that the grantee of such an easement is entitled to vary his mode of enjoying the same, and from time to time to avail himself of modern inventions; if, by so doing, he can more fully exercise and enjoy the object or carry out the purpose for which the easement was granted . . . .

If then those living in a rural district with only such unlimited private ways as that involved here are to enjoy any of the modern conveniences, such as electric light, natural gas, telephones, and the like, they must of necessity rely upon such ways by which to obtain them. To deny them such right would be to stop to some extent the wheels of progress, and invention, and finally make residence in the country more and more undesirable and less endurable. Where there has been such an unlimited and unrestricted grant of a way we think it may be reasonably implied that the parties intended an unlimited reasonable use thereof, as distinguished from an unreasonable and improper one. It is fully shown in the evidence in this case that the poles and wires are so set and hung as to constitute no invasion of plaintiff's right or any obstruction to the enjoyment by him of the residue of his land.

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97. *Id.* at 347 (quoting *Harvey v. Walters*, 8 L.R.-C.P. 162 (1873)).
98. 185 N.E. 516 (Ind. 1933).
99. *Id.* at 517.
100. *Davis v. Jefferson County Tel. Co.*, 95 S.E. 1042, 1044 (W. Va. 1918) (citations omitted). Notably, the court relied upon English mining cases, which held that a mine owner had the right to lay railroad lines to transport minerals in cases where railroads were unknown at the time of the grant.
In a slightly different context, this issue was addressed by the Virginia court in a case where the owner of a 955-acre tract of land in 1895 divided it into three parcels and provided for a right of way across two of the parcels to serve the third. The 1963 litigation involved the fact that the third tract was being subdivided for a residential purposes into numerous small tracts, and each owner of a subdivided tract could possibly use the right of way, thereby adding to the burden. While the case involved modern technology in the sense that automobiles would be used rather than horse and buggy, the more important question in the case was the increased traffic resulting from the subdivision of the third parcel. The Virginia court answered the question by holding that the use of the right of way may be made

for any purpose to which the dominant estate may then, or in the future, reasonably be devoted. This rule is subject to the qualification that no use may be made of the right of way, different from that established at the time of its creation, which imposes an additional burden upon the servient estate.

The fact that the dominant estate is divided and a portion or portions conveyed away does not, in and of itself, mean that an additional burden is imposed upon the servient estate. The result may be that the degree of burden is increased, but that is not sufficient to deny use of the right of way to an owner of a portion so conveyed.

One of the underlying principles of these and other cases involving mining rights or other uses of the land, be they electric interurban lines, truck logging roads, telephone lines, or vehicular traffic, is that the property rights issue has been a question of law decided by the court. Indeed, this proposition was squarely addressed by the West Virginia court in Adkins v. United Fuel Gas Co., where the West Virginia court held that the question of mining rights, indeed the use of any easement, was a question of law for the court. Stated the court:

It may be said at this point that we do not think that whether the plaintiff's rights have been invaded, or whether the defendant has exceeded

102. Id. at 639-40 (citations omitted).
103. 61 S.E.2d 633 (W. Va. 1950).
its rights are questions of fact for determination of the jury. In a case where there is a dispute of fact, the jury should find the facts, and from such finding of facts by the jury it is the duty of the court to determine whether the use of the surface by the owner of the minerals has exceeded the fairly necessary use thereof, and whether the owner of the minerals has invaded the rights of the surface owner, and thus exceeded the rights possessed by the owner of such minerals.\(^\text{104}\)

These cases stand in stark contrast to \textit{Lowe v. Guyan Eagle Coals, Inc.},\(^\text{105}\) where the West Virginia court without reference to any precedent set aside a summary judgment on the issue of whether modern coal trucks could use a right of way created in a 1902 deed for the express purpose of transporting coal and other substances and with the express right to construct and use “roads, tramways, railroads, side tracks.” In setting aside the summary judgment and remanding the issue of whether modern coal trucks would constitute a burden greater than contemplated in 1902, the court seemed to cast doubt on two firmly established principles of the previous cases, the first being that the use of easements could be devoted to modern technology, and the second being that the issue of such use was a question of law for the court and not a jury.

In view of the absence of any citation to prior authority on these points, the West Virginia court in the future will hopefully adhere to the sound logic of its prior cases and hold that the owners of land may employ modern technology, whether they be mineral or surface owners, and that the question of such rights will be considered questions of law for a court to decide.

\textbf{I. Conclusion}

The longwall cases, as well as other cases involving new or modern technology, generally hold that new technology can be employed in the use of surface easements or mining rights; however, the test in any case will be whether the rights or burdens being imposed are

\(^{104}\) \textit{Id.} at 636; \textit{see also} Justice v. Pennzoil Co., 598 F.2d 1339 (4th Cir.), \textit{cert. denied}, McKinney v. Pennzoil Co., 444 U.S. 967 (1979), where this principle was followed as a matter of substantive state law; Broker Title Co. Inc. v. St. Paul Fire & Marine Ins. Co., 610 F.2d 1174 (3d Cir. 1979); and \textit{Culp, supra} note 23, for Pennsylvania substantive law.

\(^{105}\) 273 S.E.2d 91 (W. Va. 1980).
different than those provided at the time of the creation of the rights. In the case of longwall mining, it appears clear that such mining method is included in the panoply of implied rights that go with coal ownership. Whether this right can be exercised in a given situation will depend on whether its substantive effect, subsidence, will cause substantial injury to the surface or overlying strata. Where substantial damage will result, a waiver becomes necessary.

III. EFFECT OF THE SURFACE MINING ACT

A. Background

The subject of mining rights generally, and longwall mining in particular, would be incomplete without consideration of the Surface Mining Control and Reclamation Act of 1977 and the state counterparts. This Act has had a greater effect on longwall mining and other mining rights than any single case.

Prior to passage of the Act, considerable congressional debate ensued over the issue whether or not to include underground mining within the scope of the Act. The conclusion, of course, was to include in the definition of "surface coal mining operations" the "surface impacts incident to an underground coal mine . . . ."107

Regulation of such surface impacts was accomplished in section 516 of the Act,108 which requires the Secretary of Interior to "promulgate rules and regulations directed toward the surface effects of underground coal mining operations" with the proviso that in doing so, the Secretary shall consider the distinct differences between surface coal mining and underground coal mining. Importantly, this section delineates specific requirements for underground mines in mandating that

permits be obtained and that, when issued, they require the operator to seal portals and holes, to provide for safe disposal of mine wastes, to regrade and provide vegetative cover, to minimize disturbance of hydrologic balance, and, where not otherwise specified, to operate in accordance with the standards applicable to surface mining under section 515 of the Act. 109

The specific requirement of section 516 with respect to longwall mining is that the permit require the operator to:

adopt measures consistent with known technology in order to prevent subsidence causing material damage to the extent technologically and economically feasible, maximize mine stability, and maintain the value and reasonably foreseeable use of such surface lands, except in those instances where the mining technology used requires planned subsidence in a predictable and controlled manner . . . . 110

As one writer put it, it is generally recognized that this language "implicitly recognizes the congressional intent that longwall mining is ecologically preferable and explicitly endorsed." 111

Upon passage of the Act, the Secretary promulgated regulations, both interim and permanent as required, and there ensued a series of challenges and changes. A comprehensive review of these matters is beyond the scope of this article; however, the impact of the act on longwall mining and similar mining rights will be examined. 112

B. Regulation of Longwall Mining Under the Act

The literal language of the Act exempts longwall operators from the requirement to adopt "measures . . . to prevent subsidence causing material damage." Despite this exemption, the purport of the cases arising under the Act has been that all operators, longwall included,

111. Timothy W. Gresham, Federal Legislation and OSM Regulation of Subsidence, Coal Mine Subsidence Special Institute, Ch. 5 E. MIN. LAW FOUND. (1989) (quoting H.R. Rep. No. 218, 95th Cong., 1st Sess. 93 (1977)).
112. A comprehensive review of common law rights and the effect of the Surface Mining Act may be found in the various articles compiled for the Special Institute on Coal Mine Subsidence, E. MIN. LAW FOUND. (1989). See, e.g., Gresham, supra note 111.
must file subsidence control plans and otherwise comply with the requirements of the Act, including payment of damages at least for injury to surface structures.

In one of the first challenges to the regulations under the Act, *In re Permanent Surface Mining Regulation Litigation*, the coal industry raised the issue whether the Act required a subsidence control plan for operations employing planned and controlled subsidence and whether the various surface restoration requirements were authorized. The decision of the court was clear in holding that a subsidence control plan is required in such cases, the court reasoning that unless a plan is filed, the regulatory authority is unable to determine that the exemption of section 516 from "material damage" applies.

With respect to payment of damages, the original regulations adopted in 1979 required operators to correct material damage to structures and the land. In 1982, the regulations were amended to require an operator to correct damage to structures, either by repair or compensation, "[t]o the extent required under State law." The state-law limitation, which in essence gave recognition to waivers of damages, was challenged, and in *National Wildlife Federation v. Lujan*, the district court held that this limitation was "contrary to the Act and arbitrary." However, on appeal the court reversed and held that the regulations were a "permissible interpretation" of the Act. In doing so, the court found that the primary purpose of the Act was the protection of the land, and while the "public may have an interest in protecting privately-owned structures, the Secretary may conclude, in the absence of an explicit congressional directive, that this public interest does not outweigh private property and contract rights."
In 1992, the hotly debated issue of the obligation to repair structures was resolved when Congress put the big foot down by enacting, as part of the Energy Policy Act of 1992, an amendment to the Surface Mining Act providing that:

Underground coal mining operations conducted after the date of enactment of this section shall comply with . . . the following requirements:

(1) Promptly repair, or compensate for, material damage resulting from subsidence caused to any occupied residential dwelling and structures related thereto, or non-commercial building due to underground coal mining operations.122

As state counterparts to the Surface Mining Act were enacted and regulations adopted, no one company contributed more to the jurisprudence under the Surface Mining Act than Old Ben Coal Company in the State of Illinois. Single-handedly, Old Ben has established that coal operators using techniques involving planned subsidence, such as longwall mining, have no duty to prevent subsidence, but must repair or restore damage to surface lands and structures;123 that the Surface Mining Act supplements common law and provides an independent cause of action for damages;124 that certain prohibitions of the Act do not apply to mining operations existing prior to the effective date of the Act;125 and that specific rights exist with respect to pipelines.126

C. Effect of Act on Common Law Rights

The common law developed literally with over two centuries of cases dealing with mining problems. The surface mining act is superimposed on these rights and principles. In the sixteen years the act has

125. Phillips, supra note 72.
been in effect, there have occurred only a handful of cases which provide direction as to how the act affects common law rights.

Perhaps the clearest and starkest indication came from the first reported case on this subject, *Melvin v. Old Ben Coal Co.* In that case, the coal ownership was severed in a deed which contained a waiver of the support right. Old Ben conducted longwall mining, and subsidence damaged the surface owner’s dwelling, swimming pool, and outbuildings. The court decided: (1) it is clear that the Act allows subsidence under circumstances such as longwall mining, hence, longwall mining is permitted under the Act; (2) longwall mining is not exempt from all provisions of the Act relating to subsidence control; namely, the duty to repair or compensate for damages to structures; and (3) the Surface Mining Act creates an independent cause of action, and to the extent a waiver exists, it is unenforceable against damages available under the Act.

An interesting decision was reached by the West Virginia Supreme Court of Appeals in *Rose v. Oneida Coal Co.*, where the plaintiffs made a frontal attack on waivers of support arguing that they violated public policy. This argument was rejected, and the court held that common law waivers remained valid against common law attacks. The plaintiffs did not assert a cause of action under the Act, and the court, noting *Melvin*, volunteered that “although we believe that [the West Virginia Surface Mining Act] has changed many of the old common law rules concerning the rights and remedies of surface owners vis a vis mineral owners, the dimensions of those changes are as yet uncertain.” A direct challenge to the validity of waivers based upon the Surface Mining Act was made in *Smerdell v. Consolidation Coal Co.*, and the federal district court in West Virginia held that nei-

128. Id. at 135-37.
129. Id. at 136-37.
130. Id.
132. Id. at 816; see also *Cogar v. Faerber*, 371 S.E.2d 321 (W. Va. 1988), for an indication of where West Virginia may be headed.
ther the federal nor state act have rendered common law waivers invalid.\footnote{134}

In \textit{Shell Pipe Line Corp. v. Old Ben Coal Co.},\footnote{135} Old Ben conducted longwall operations beneath Shell's pipeline. In order to protect against subsidence damage to the pipeline, Shell undertook preventive measures and sued for the cost. The court found that no damage occurred due to these preventive measures and denied recovery because the Illinois act did not provide for recovery in such an instance. In an excellent article on this topic, Terry Black comments that both Shell and Old Ben subsequently refused to provide protective measures with respect to proposed longwall panels and that the Illinois Department of Mines and Minerals denied permits.\footnote{136}

In \textit{Phillips v. Old Ben Coal Co.},\footnote{137} the court recognized that the mining company's longwall mining operations preexisted enactment of the Surface Mining Act, and accordingly, held that the prohibition against mining within 300 feet of an occupied dwelling did not apply to the mining operations.

Although Virginia has adopted a counterpart to the Act,\footnote{138} no claim under the State Act appears to have been made in \textit{Large v. Clinchfield Coal Co.},\footnote{139} and no mention of the Act appears in the opinion of the court, although the decision is one of the most significant on longwall mining and the effects of subsidence.

In \textit{Citizens Organized Against Longwalling v. Division of Reclamation},\footnote{140} challenge was made in Ohio to the sufficiency of the

\footnote{134. \textit{Id.} at 1284. In so ruling, the court relied upon Russell v. Island Creek Coal Co., 389 S.E.2d 194 (W. Va. 1989), wherein the Supreme Court of Appeals of West Virginia upheld the validity of a waiver for damages to watercourses, holding that a waiver that clearly was directed at a right protected under the Surface Mining Act was valid. Based upon this reasoning, the court in \textit{Smerdell} similarly held that a waiver of subsidence damages remained valid even after passage of the Surface Mining Act.


136. \textit{See} Terry R. Black, \textit{Miscellaneous Surface Owner Issues}, Coal Mine Subsidence

137. \textit{Phillips, supra} note 72, at *3.


139. 387 S.E.2d 783 (Va. 1990).

140. 535 N.E.2d 687 (Ohio Ct. App. 1987).}
application for a permit on the ground that inadequate measures were provided to protect the hydrologic balance. This case involved a plan to longwall mine sixty to seventy thousand acres “from now until the year 2022.”

Several issues were raised with respect to the adequacy of the application for a permit and the ability to assess the impact of the mining on the hydrologic balance. These issues were resolved upon the particular facts. Importantly, the court held that “the longwall method is not necessarily inconsistent with preventing or minimizing subsidence damage to water sources . . . .” Where water supplies will be damaged, the court recognized the requirement that the operator submit a plan for replacement. The plan at issue was held to be inadequate where piped water was proposed without a promise by the operator “to pay the water bills.”

D. Conclusion

Cases decided under the Act indicate first, that longwall mining is permitted under the Act; second, that performance standards of the Act generally apply to longwall mining, however the debate goes on; and third, that if any damages result from longwall mining to the surface land or certain structures, the operator must repair or pay for the damage.

IV. LONGWALL MINING AND OIL AND GAS OPERATIONS

A. Nature of Conflict

As long as oil and gas operations have existed in areas of coal reserves and active coal operations, a natural conflict has existed between the two industries. This conflict has been heightened in recent years with the increased interest in developing coalbed gas existing in the coal, as well as the increased use of longwall mining.

141. Id. at 688.
142. Id. at 688 (Syll. Pt. 3).
143. Id. at 688 (Syll. Pt. 4).
144. Richard J. Bolen, in his article Coal Versus Oil and Gas: Resolving Mineral Conflicts In the Era of Longwall Mining, supra note 11, provides an excellent analysis of the
1. Danger to and Protection of Coal

Traditional oil and gas wells present to the coal owner and operator the danger of gas escaping into the coal bearing formations. Protection against this danger is generally addressed in state statutes which require that protective measures be employed in drilling oil and gas wells that penetrate coal seams or mines. In essence, these statutes require that such wells be cased and sealed so that oil, gas, water, and other materials are prevented from moving through the well into the coal seam.145

2. Distance Limitation

The ultimate risk to a coal operator is mining through a well that is unknown or not properly located. In the vernacular, "all hell breaks loose" when this happens.

For safety purposes, current statutes require that notice be given by a coal operator to an oil and gas operator when mining comes within 500 feet of a well. Thereafter, mining may continue to within certain distances of oil and gas wells. These distances differ among the states: 250 feet in Illinois;146 25 feet in Ohio;147 200 feet in Virginia,148 and 200 feet in West Virginia.149 Mining may continue beyond this point generally only with the consent of the oil and gas operator or regulatory authority.

These distance limitations result in the loss of coal and often add to the expense of mining. With traditional room and pillar mining, the

many conflicts existing between coal and oil and gas operations, particularly with respect to longwall mining operations. This article will supplement Bolen's article and update it for statutes enacted subsequent to its writing.

145. W. VA. CODE §§ 22B-1-18 to -21 (repealed 1994) (current version at W. VA. CODE §§ 22-6-18 to -21 (1994)).
146. ILL. ANN. STAT. ch. 96 1/2, para. 5431 (current version at ILL. ANN. STAT. ch. 225, para. 725, § 20 (Smith-Hurd 1993)).
148. VA. CODE ANN. § 45.1-340(B) (Michie 1950).
effect is softened by the ability to adjust the mine plan to go around the area affected by the well once it is properly located.

Longwall mining involves the development of panels where 100% of the coal will be mined. The equipment and machinery do not permit the flexibility to mine around wells located either within the panel or the angle projected upward where subsidence will occur. Imposition of the above distance limitations results in a much greater impediment to coal development. Further, the development of a mine for longwall mining will usually involve long range plans for the layout of the panels. Thus, special cause for conflict occurs where longwall mining is employed.

B. Resolution of Conflicting Interests

1. Active Wells

Active oil and gas wells present impediments to coal mining, and no statutory provisions or common law principles allow a coal operator to mine through active wells. In such cases, the above distance limitations must be followed.

2. Inactive Wells

Generally, state statutes require that wells which are no longer capable of production or in fact do not produce for certain amounts of time (for example, twelve consecutive months in West Virginia)\(^\text{150}\) must be plugged. These statutes in turn require that special protective measures be taken to plug the well so that cement or other material is placed below, and perhaps above, the coal to a sufficient depth to seal the well and prevent gas, oil, or other substances from moving through the well and into the coal seam. Depending upon the casing in the well, additional measures are required to prevent substances from entering the coal from above.\(^\text{151}\)

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151. See, e.g., W. VA. CODE § 22B-1-24 (repealed 1994) (current version at W. VA.
The primary duty to plug exists in the well operator, and in certain states, has been expanded to include nonoperators and other parties. In many situations, old wells exist which were either not plugged at all or not plugged according to current safety standards. Typically no responsible operator is around to take care of the problem. State statutes often provide a mechanism either for the state to plug or for an adjoining land or mineral owner to plug. The problem of old abandoned wells can be acute, particularly with respect to longwall mining where a well is located in the middle of a panel. Thus, the real question is not so much whether a previous operator can be held responsible as it is who has the right to plug. West Virginia addressed this problem through enactment of the Abandoned Well Act in 1992. This Act provides that any owner adversely affected by an abandoned well has the right to plug it. So long as this right exists, the expense of plugging a well so that it can be mined through is generally justified.

3. Proposed Wells

Certain states have enacted statutes that adopt measures to resolve conflicting interests to develop oil and gas on the one hand, and to develop coal on the other. The problem presents itself when an oil and gas operator proposes to locate a well in, or sufficiently close to, a longwall panel so that it jeopardizes future mining. Set out below are summaries of selected state laws.

---

**Code § 22-6-24 (1994).**


a. West Virginia

In obtaining permits for oil and gas wells, the applicant must give notice to the coal owner and operator of the proposed location for the well.\footnote{156. W. VA. CODE § 22B-1-9 (repealed 1994) (current version at W. VA. CODE § 22-6-9 (1994)).} If the location will interfere with coal development, the coal owner may then object.\footnote{157. W. VA. CODE §§ 22B-1-15 to -17 (repealed 1994) (current version at W. VA. CODE §§ 22-6-15 to -17 (1994)).} In the case of shallow wells—wells completed in a formation above the top of the “Onondaga Group,”\footnote{158. W. VA. CODE § 22-7-2(21) (repealed 1994) (current version at W. VA. CODE § 22C-8-2(21) (1994)).} resolution is made by the Shallow Gas Well Review Board.\footnote{159. W. VA. CODE §§ 22-7-1 to -19 (repealed 1994) (current version at W. VA. CODE §§ 22C-8-1 to -19 (1994)).} In the case of deep wells—wells completed at or below the Onondaga—resolution is made by the Department of Energy.\footnote{160. W. VA. CODE §§ 22B-1-1, -15 (repealed 1994) (current version at W. VA. CODE §§ 22-6-1, -15 (1994)).} In either case, authority is given to approve the location as requested in the application, to ascertain an alternate location which will allow a well to be drilled with minimal impediment to coal development, or to deny the permit. Where relocation necessitates pooling with other tracts, provisions exist therefor.\footnote{161. W. VA. CODE § 22-7-9 (repealed 1994) (current version at W. VA. CODE § 22C-8-9 (1994)) (shallow wells); W. VA. CODE § 22-8-7 (repealed 1994) (current version at W. VA. CODE § 22C-9-7 (1994)) (deep wells).}

b. Kentucky

If an oil and gas well is to extend through coal bearing strata, the well operator must file a plat with the Department of Mines and Minerals and the coal owner or operator showing the exact location of the proposed well.\footnote{162. KY. REV. STAT. ANN. § 353.050.1 (Michie/Bobbs-Merrill 1993).} The affected coal operator may then file objections with the Department if the drilling will endanger the present or future
use or operation of a workable coalbed. At the hearing, the objections will be considered, and if the parties cannot agree, the Department shall fix a location on the tract as near to the proposed location as possible. A Kentucky Attorney General Opinion has made it clear that permit applications are to be held for five days to allow the coal owner/operator/lessee time to object, and that in the absence of failing to follow time limitations or failing to act on reasonable information, a permit must issue.

c. Ohio

If an oil or gas well is, or is to be, located in a coal bearing township, the chief of the Division of Oil and Gas sends copies of the permit application and required map to the chief of the Division of Mines who then notifies the owner/lessee of any affected mine. The owner or lessee may object to the location of the well or any relocation site within fifty feet of the original location. If the chief of the Division of Mines determines that the objections are well founded, he must disapprove the application and return it, together with his reasons and suggestions for a new location. The applicant may then amend his application to drill at the location suggested by the Division of Mines or file an appeal with the Mine Examining Board. The chief of the Division of Mines may suspend the drilling or re-opening of a well if he determines that it represents an imminent or substantial threat to public health or safety.

d. Virginia Oil and Gas Act

Applicants for oil or gas well permits must notify coal owners, and surface owners on the tract to be drilled, as well as those coal

164. Id. § 353.060.
167. Id. § 1509.08.
168. Id.
169. Id.
operators who have registered operation plans or activities located on the tract to be drilled. The only objections that may be made by coal owners or operators are set forth in the Act, e.g., distance limitations, safety, arbitrary exercise of the well operator’s exploratory rights, etc. The Virginia Oil and Gas Board holds an informal hearing to consider the objections. This decision may be appealed to the appropriate circuit court, thus staying the permit until the court has rendered a decision. The Virginia Act also sets forth safety aspects to be considered in deciding on a coal owner’s objections to a new well permit, establishment of a drilling unit, or permit for the stimulation of a coalbed methane well. No order or permit shall be issued where evidence indicates the proposed activity will be unsafe. The Board on its own motion, or on an application by a gas or oil owner, is also empowered to establish or modify drilling units, and upon additional findings of fact, may modify boundaries of a pool, drilling units for a pool, and allowable production.

e. Pennsylvania Coal and Gas Resource Coordination Act

This Act applies to all gas wells that penetrate a workable coal seam and does not apply to gas wells that are in fact drilled to depths penetrating the Onondaga horizon, or oil wells. Coal owners receive notice of proposed wells from the Department of Environmental Resources, when a proposed well is located above an active coal mine, and may file a written objection to the proposed drilling. If the well operator and objecting coal seam owner are unable to agree, their differences are submitted to a panel for arbitration. Based on the

173. VA. CODE ANN. § 45.1-361.9(A), (C) (Michie Supp. 1993).
174. Id. § 45.1-361.11(B).
175. Id.
179. PA. STAT. ANN. tit. 58, § 512(c) (Supp. 1993).
information it receives, the panel shall choose the location, if any, on
the permit applicant's tract which "(1) [p]ermits the proposed gas well
to be drilled without endangering the safety of persons in any coal
mine [and] (2) [a]llows for the maximum recovery of gas and removal
of coal."\textsuperscript{180}

C. Coalbed Gas Development

One of the unique aspects of longwall mining is the fact that high
concentrations of methane are apt to develop in the gob area soon
after mining, and in such cases, profitable production of the methane
can be obtained. This occurs through the subsidence process whereby
the rock strata and overlying coal seams fracture, creating a destressed
zone around the coal seam. This destressed zone is a panacea for a
gas developer who generally must stimulate, or fracture, the production
horizon in order to allow for the passage of gas to the well head. The
deressed zone in a mined-out area constitutes the ultimate fracture
job, thereby often allowing prolific production.

In any mining operation, longwall or otherwise, gas in the coal
seam represents a danger, and proper ventilation of mines is strictly
regulated by both federal and state law.\textsuperscript{181} In many cases, it is desir-
able to degasify a coal seam in advance of mining, and oftentimes,
vent holes are drilled into the seam for that purpose. In the absence of
a ready means to produce this gas commercially, it is often vented into
the atmosphere.

Like many other technologies that parties to early severance deeds
perhaps never contemplated, it is now possible in many areas to devel-
op the coalbed methane commercially. An impediment to this develop-
ment in many cases is the question of ownership of the gas existing
in coal seams. In some states, the issue has been litigated with the
general purport of the decisions being that the coal owner owns and
has the exclusive right to develop the gas existing in the coal seam;
however, the gas that escapes from the seam is owned by the gas

\textsuperscript{180} PA. STAT. ANN. tit. 58, § 512(d) (Supp. 1993).
\textsuperscript{181} See, e.g., W. VA. CODE §§ 22A-1A-2 to -5 (Supp. 1993); 30 C.F.R. §§ 75.313,
75.344 (1993).
owner. In part, the decision with respect to the ownership of gas escaping from the coal seam has been based upon the qualified theory of ownership.\textsuperscript{182}

In the eastern states, Virginia is commonly touted as having successfully dealt with the ownership problem through passage of amendments to its oil and gas statute in 1990. The principle feature that enables methane development to proceed are provisions in the statute for pooling of interests and unitization and the escrow for conflicting claimants.

The subject of coalbed methane development was a significant feature of the Energy Policy Act of 1992,\textsuperscript{183} which provides for a federal regulatory framework to facilitate methane development with substantive provisions similar to those in the State of Virginia for pooling and unitization and escrow for conflicting claimants.\textsuperscript{184} Finally, Congress, in passing the Energy Policy Act of 1992, provided for a regulatory framework to facilitate methane development with provisions similar to those in the State of Virginia for pooling and unitization and escrow for conflicting claims. Under the federal legislation, states are given the option of submitting to regulation under the federal program or developing their own legislative schemes for development of methane by 1995.

As of this writing (March 1994), the State of West Virginia appears to be the first state to pass legislation that provides for such a state regulatory framework.\textsuperscript{185} As the drafter of the original bill,


\textsuperscript{185} This legislation passed as Engrossed House Bill 4371 on the last day of the regular session of the legislature at approximately 11:00 p.m., March 12, 1994. H.B. No. 4371, 71st W. Va. Legis., 2d Reg. Sess. (1994) (to be codified at W. VA. CODE §§ 22-21-1 to -29 (1994)).
which formed the basis for this legislation, I participated in the negotiations and debate on behalf of the coal industry. The areas of compromise and certain aspects of the bill are significant, particularly with respect to the issues involving longwall mining. Both the coal and gas industries in West Virginia were interested in state legislation to facilitate methane development, and no disagreement existed on the provisions that provided for permitting of wells, notice to interested parties, pooling of interests, and escrow provisions for conflicting claimants to the methane. The controversy, which existed for a period of three years between the two industries, centered upon two key issues: first, whether the coal industry would control the stimulation or fracturing of a coal seam by having the right of absolute veto; and second, whether there could be a mechanism to deal with the problem of methane wells being an impediment to active mining operations either by spacing or mine through rights. While certain of these issues were discussed over a period of several years, it took the deadlines of a sixty day legislative session and the skillful arbitration of House of Delegates Speaker Chuck Chambers to achieve a compromise with which both industries believed they could live. In doing so, the coal industry acceded to the gas industry request for a review process in the event a coal owner refused consent to stimulation. The gas industry for its part agreed to a requirement that the methane operator prove by clear and convincing evidence that the coal seam will not be damaged and mining rendered unsafe by stimulation, providing financial security to cover damages to the coal seam, strict liability in the event the seam is damaged, spacing provisions under which the coal owner's consent is necessary in order to locate a well within 1,600 feet of another coalbed methane well, and, finally, provisions which allow the coal owner to mine through a coalbed methane well in the course of its active operations. With these key provisions, both industries supported the bill through final passage.

186. Id. (to be codified at W. VA. CODE § 22-21-7 (1994)).
187. Id. (to be codified as W. VA. CODE § 22-21-13(c) (1994)).
188. Id. (to be codified at W. VA. CODE § 22-21-13(d)(5) (1994)).
189. Id. (to be codified at W. VA. CODE § 22-21-13(e) (1994)).
190. Id. (to be codified at W. VA. CODE § 22-21-20 (1994)).
191. Id. (to be codified as W. VA. CODE § 22-21-22 (1994)).
192. As a participant in the drafting and negotiations, it bears mention that the respec-
Resolution of the title question, even in those states where decisions have been reached, will remain an issue in the development of coalbed methane. It is hoped that the compromise reached in the State of West Virginia will help to resolve the serious conflict that arises if coalbed methane wells interfere with coal mining, particularly where wells are located in areas planned for longwall development.

While one writer has commented that “rarely has so much been written by so many about so little,” it is submitted in conclusion that debate regarding coalbed gas development has important ramifications and is far from over.

D. Conclusion

Ten years ago, the law review articles raised the issues and suggested the arguments pro and con whether longwall mining is an implied mining right. Many of the questions raised have been answered. Like the 1900 Texas hill country farmer who never contemplated that his grandson might be responsible for the construction of a massive dam on the Padernales River to generate electricity for his farm house, we should know today that there will be new technology tomorrow which we do not yet understand, contemplate, or foresee. The principles of mineral rights, really land use, which applied in the past ten years, indeed in the last 400, should apply to the next 400 years.

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tive industries wisely limited the number of negotiators and all sessions were conducted in an honorable and good faith effort to achieve a fair result. On every occasion, a person’s word or handshake was as good as gold. The key negotiators included Neal Pierce and Benjamin Snyder (Columbia Natural Resources) and George Mason (Equitable Resources) for the gas industry and Claude Morgan (Consolidation Coal Company), Kevin Walls (Western Pocahontas Properties Limited Partnership), and myself.

193. Richard J. Bolen, Oil and Gas v. Coal—Conflicts on the Surface, Beneath the Surface, and Within Coal Seams, Special Institute on Conflicts, Ch. 3 E. Min. L. FOUND. (1990).

194. It took until almost 1940 before electricity became available to the Texas hill country, and then, primarily through the efforts of Congressman Lyndon Johnson. This particular accomplishment is detailed in CARO, supra note 3, at 516-28.
Surely as long as two or more entities own estates in the same land, there will be conflicts and tensions. Just as surely, there will be new technology for both surface and mineral development. The basic rule that should guide any new case is one that allows each owner those rights to use and enjoy his separate estate that are both necessary (reasonably necessary) and reasonable (will not cause substantial injury or burden on the other). The exercise of such rights will, and should be, tempered with the obligation to have “due regard” to accommodate the other owner and, in the appropriate case, to employ alternate means.

In the final analysis, most of these rules have been used to determine rights for centuries. They are good law and most likely will, and should, be used when technology is developed tomorrow—technology which is just as different as the longwall technology of today is to the methods of the 1900 miner and Texas hill country farmer.
Appendix 1

Mechanization of the Mining Industry in West Virginia and the Corresponding Decrease in Fatal Injuries

<table>
<thead>
<tr>
<th>Year</th>
<th>Tons of Production</th>
<th>Employees</th>
<th>Fatal Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910</td>
<td>59,274,353</td>
<td>68,135</td>
<td>320</td>
</tr>
<tr>
<td>1920</td>
<td>89,590,271</td>
<td>97,426</td>
<td>320</td>
</tr>
<tr>
<td>1930</td>
<td>122,429,767</td>
<td>107,832</td>
<td>412</td>
</tr>
<tr>
<td>1940</td>
<td>126,619,825</td>
<td>103,457</td>
<td>376</td>
</tr>
<tr>
<td>1950</td>
<td>145,563,295</td>
<td>119,568</td>
<td>185</td>
</tr>
<tr>
<td>1960</td>
<td>120,107,994</td>
<td>48,696</td>
<td>115</td>
</tr>
<tr>
<td>1970</td>
<td>143,132,284</td>
<td>45,261</td>
<td>63</td>
</tr>
<tr>
<td>1980</td>
<td>121,583,762</td>
<td>43,609</td>
<td>33</td>
</tr>
<tr>
<td>1990</td>
<td>171,155,053</td>
<td>25,266</td>
<td>13</td>
</tr>
</tbody>
</table>
Appendix 2

Tons of Production by Method in West Virginia

<table>
<thead>
<tr>
<th>Year</th>
<th>Conventional</th>
<th>Continuous</th>
<th>Longwall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>65,581,282</td>
<td>28,299,983</td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>65,374,785</td>
<td>28,071,768</td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td>62,644,183</td>
<td>32,623,695</td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>64,115,766</td>
<td>32,647,780</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>65,629,959</td>
<td>34,267,185</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>5,564,627</td>
<td>37,997,794</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>3,243,181</td>
<td>36,363,006</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Other</th>
<th>Surface</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>10,659,854</td>
<td>23,326,256</td>
<td>127,867,375</td>
</tr>
<tr>
<td>1986</td>
<td>10,660,108</td>
<td>26,680,572</td>
<td>130,787,233</td>
</tr>
<tr>
<td>1987</td>
<td>12,668,556</td>
<td>29,715,842</td>
<td>137,652,276</td>
</tr>
<tr>
<td>1988</td>
<td>12,777,334</td>
<td>35,376,908</td>
<td>144,917,788</td>
</tr>
<tr>
<td>1989</td>
<td>12,562,117</td>
<td>39,371,559</td>
<td>151,830,820</td>
</tr>
<tr>
<td>1991</td>
<td>177,237</td>
<td>46,066,625</td>
<td>166,715,271</td>
</tr>
<tr>
<td>1992</td>
<td>419,483</td>
<td>47,418,012</td>
<td>163,797,710</td>
</tr>
</tbody>
</table>

Appendix 3

United States Production By Mining Method\textsuperscript{196}

<table>
<thead>
<tr>
<th>Year</th>
<th>Continuous</th>
<th>Conventional</th>
<th>Longwall</th>
<th>Shortwall and Other</th>
<th>Total in 000's</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>206,360,000</td>
<td>33,642,000</td>
<td>59,175,000</td>
<td>1,202,000</td>
<td>300,379</td>
</tr>
<tr>
<td>1990</td>
<td>267,464,000</td>
<td>29,718,000</td>
<td>123,118,000</td>
<td>4,246,000</td>
<td>424,546</td>
</tr>
<tr>
<td>1991</td>
<td>239,221,000</td>
<td>46,454,000</td>
<td>118,948,000</td>
<td>1,721,000</td>
<td>406,344</td>
</tr>
<tr>
<td>1992</td>
<td>232,339,000</td>
<td>45,328,000</td>
<td>127,711,000</td>
<td>957,000</td>
<td>406,335</td>
</tr>
</tbody>
</table>

\textsuperscript{196} This chart is a compilation of figures published by the NATIONAL COAL ASSOCIATION in FACTS ABOUT COAL, 25 (1993), and in Annual Coal Production Reports of the U.S. Department of Energy (apparently no separate breakdown was made for longwall mining for the years 1984-1989).
Appendix 4

Rank of States by Number of Longwall Mines

<table>
<thead>
<tr>
<th>State Ranking</th>
<th>Number of Systems in 1989</th>
<th>Number of Systems in 1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. West Virginia</td>
<td>28</td>
<td>26</td>
</tr>
<tr>
<td>2. Pennsylvania</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>3. Virginia</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>4. Alabama</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>5. Illinois</td>
<td>09</td>
<td>10</td>
</tr>
<tr>
<td>6. Colorado</td>
<td>06</td>
<td>03</td>
</tr>
<tr>
<td>7. Kentucky</td>
<td>06</td>
<td>05</td>
</tr>
<tr>
<td>8. Utah</td>
<td>05</td>
<td>06</td>
</tr>
<tr>
<td>9. Ohio</td>
<td>04</td>
<td>04</td>
</tr>
<tr>
<td>10. Maryland</td>
<td>01</td>
<td>01</td>
</tr>
<tr>
<td>11. Wyoming</td>
<td>01</td>
<td>01</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>95</strong></td>
<td><strong>93</strong></td>
</tr>
</tbody>
</table>

197. West Virginia Coal Mine Safety and Technical Review Committee, West Virginia Coal Forum for 1989, and Paul C. Mevrett, Longwall Census '92, COAL MAGAZINE.
Appendix 5

Percentage of Longwall Mining Accidents to Total Mining Accidents

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Mining Accidents</th>
<th>Longwall Accidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987</td>
<td>2595</td>
<td>37 (1.4%)</td>
</tr>
<tr>
<td>1988</td>
<td>2685</td>
<td>52 (1.9%)</td>
</tr>
<tr>
<td>1989</td>
<td>2469</td>
<td>46 (1.8%)</td>
</tr>
</tbody>
</table>

198. West Virginia Coal Mine Safety and Technical Review Committee and West Virginia Coal Forum.