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CONSERVATION OF MINERAL RESOURCES: A BRIEF SURVEY.1

C. C. WILLIAMS, JR.*

"And so the realm shall not have sufficient for the defense of it, to the peril and hazard of it." When, more than three centuries ago, some question arose as to the prerogative of the Crown over the scanty deposits of nitrates then available, all the Judges of England were assembled at Serjeants-Inn to consult. Their momentous declaration of the public interest in the nation's supply of gunpowder, even in peace-time, has come down to us as perhaps the earliest statement of the principle of conservation. And since that time, protecting or utilizing vital minerals for the benefit of all has been generally accepted everywhere as a received ideal3 of the common law. Thus, "the preservation of the natural resources of the state,"4 through the reasonable exercise of "the legislative power"5 to prevent waste, is today unquestionably constitutional.

1 The present article represents a study undertaken for the Committee on Resources of the State, of West Virginia University, in behalf of the West Virginia State Planning Board formerly existing under executive order.

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2 The King's Prerogative in Saltpetre, (All the Judges of England), 12 Co. Rep. 12 (1607). Sir Edward Coke reports the reasoning of the Judges in rather modern language: "Yet inasmuch as this concerns the necessary defense of the realm, the King shall not be driven to buy it in foreign parts; and foreign princes may restrain it at their pleasure, in their own dominions." See, also, Case of Mines, 1 Plowden 310 (1567).


5 Ohio Oil Co. v. State of Indiana, 177 U. S. 190, 210, 20 S. Ct. 576, 44 L. Ed. 729 (1900), sustaining the validity of an Indiana statute preventing waste of oil and gas.
within the due-process clause. Hence a problem of the present is obviously the proper formulation of statutory policies that will adequately regulate over-hasty depletion of mineral supplies essential to national welfare.

It is seldom realized that mining is the Cinderella of our political economy: though rightfully coordinate with agriculture and manufacturing, in practice it receives little or insufficient attention. As one stumbles through the litter of leading decisions in reports and digests, or searches volume after volume of session laws, the surprising thing is their tendency to ignore modern doctrines of conservation. The fact that the nation leads the world in variety and abundance of mineral deposits, — so that it furnishes almost half of the world’s mineral yield, and produces nearly as much of the mechanical energy in all the world, — often goes wholly unnoticed. Naturally enough, “in the happy stage of skimming off the cream of the resources,” the common law has taken that very abundance of mineral supplies simply as a matter of course. Until comparatively recent decades, any notion that the spendthrift habits and impetuous expansion of the pioneering agricultural-community period must ultimately give way to more orderly and less wasteful development for the industrial future, was scarcely discernible in legal writings. It was merely assumed, without discussion, private enterprise with its splendid achievement in the past needed no further guidance in exploiting national resources, and required no governmental assistance in the normal progress of its tasks. A combination of circumstances, including not only common examples of extreme waste but also difficulties of unmanageable surpluses in depression times, has now brought the issue definitely to the fore.

That is not to say, however, the historic ideal of conserving national resources has been completely overlooked. In the early years of the present century, there was prolonged agitation for protection of the public domain against the frauds and evasions

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7 The factual background of the material involved in this discussion is taken from NATIONAL RESOURCES BOARD, REPORT ON NATIONAL PLANNING, Part IV. Report of the Planning Committee for Mineral Policy 301-439 (1934). That report assembles all the data then available as to conservation needs respecting minerals.

8 Pound, The Ideal Element in American Judicial Decision (1931) 45 Harv. L. Rev. 136; 142-144, 147.
tolerated under the old land laws. After the grave nature of the despoothing had been proven, mineral-bearing lands were withdrawn from settlement; and in due course a group of federal laws was enacted, among these being the Alaska Coal Land Act of 1914 and the Mineral Leasing Act of 1920. With the adoption of these measures, deposits of coal, oil and gas within the public domain were then made properly available for prospecting and leasing, royalty interests being reserved in favor of the government. By and large, this early conservation movement was eminently successful. No doubt there must always be vigilant and courageous administration by federal authorities with skilled personnel, definitely-established function, adequate power and sound philosophy; but the important spade-work is accomplished here. Moreover, from the angle of scientific research, great progress has been made by private industry in the utilization of mineral products, with the result that the horse-power yield of coal and oil shows vast increase.

The brilliant technical achievements of engineers and scientists have brought formerly-unminable deposits within reach, and considerably prolonged the life of other limited sub-surface resources. No complaint can accordingly be offered as to the remarkable contribution of industrial science.

The current criticism concerns rather the waste of resources through faulty organization of mining, in all its legal and economic aspects. And the old maxim, that what is the business of everybody is the business of nobody, has held good with extraordinary consistency in this situation. Despite the intolerable loss of coal, oil and gas which is ascribable to destructive competition inherent in the very rules of the game, little enough is done to ensure economic stability in these industries. Similarly, the legal facts of surface

\[9\text{ I Lindley, Mines (3d ed. 1914) §§ 200, 200c.}\]
\[12\text{ For example, a barrel of oil conserved in the past for use now will generate four times as many horsepower as it would have done thirty years ago. Similarly, in the field of power generation, fuel engineers have reduced the average consumption of coal from 5.3 pounds per kilowatt-hour in 1908, to about a quarter of that ratio today. The cracking process has doubled and trebled the percentage of gasoline obtainable from crude. As to production itself, technicians are able to cement wells against salt-water infiltration,—to utilize lifting force of the imprisoned gas so as to increase yield,—and to drill down through the rock more than ten thousand feet in West Virginia, and actually considerably deeper elsewhere. The growing mechanization of coal mines needs no further comment.}\]
\[13\text{ As to coal, the Bituminous Coal Conservation Act of 1935 was approved August 30, 1935, (Public, No. 402, 74th Congress) but soon declared unconstitutional for various reasons in Carter v. Carter Coal Co., 298 U. S. 238, 56}\]
ownership are so infrequently reconciled to the natural facts of geology that the judicial theory of "capture" actually promotes enormous overproduction.\textsuperscript{14} The probable remedy necessary here is a preventive use of the police power, to avert unnecessary waste and to substitute the principle of an equitable share in underground minerals for the existing doctrine of development. Along with any such legislation, there could well be industrial control of production and stocks, and perhaps even of price, by methods hitherto believed to be forbidden under anti-trust laws.\textsuperscript{15}

If it is normally thought a workable policy for industry to be somewhat old-fashioned as regards any growing reliance on government supervision and coercion, then the reasons that are to justify legislative interference ought to be very serious ones. Yet, beyond question, these compelling reasons do exist. The articles against continuing the existing system of affairs strictly amount to charges of ruthless exploitation and extraction, in an environment of unnecessary depletion of mineral resources. Though there is a widespread impression that avoidable industrial losses have gradually become minimized—so as now to be classed simply as regrettable occurrences of the past—the true position during the last decade has been just the reverse of this. Certainly the reckless practice in the West Texas gas field, where in 1934 a billion cubic feet of

S. Ct. 855, 80 L. Ed. 1160 (1936). A revised measure was then re-enacted by the following Congress, so as to conform (partly at least) to the Supreme Court's decision, and on April 26, 1937, became law as the Bituminous Coal Act of 1937, (50 Stat. 72, 15 U. S. C. A. § 801). This latter was ultimately upheld by Sunshine Anthracite Coal Co. v. Adkins, 310 U. S. 381, 60 S. Ct. 907, 84 L. Ed. 1263 (1940). In due course thereafter, a price-fixing schedule was set up and is now effective; but it seems to have been a curious phase in modern governmental practice that more than five years should have been necessary to establish prices for that industry. Meantime, in April, 1941, the duration of the law was extended. As to oil, however, conservation statutes have only indirectly sought industrial economic welfare, because it has apparently been assumed that price-fixing of oil or gas could not be valid: Note (1932) 45 Harv. L. Rev. 557, 560, and Williams v. Standard Oil Co. of La., 278 U. S. 235, 49 S. Ct. 115, 73 L. Ed. 287 (1929). One might guess that the Supreme Court would today view such a legislative stabilization of prices far more leniently in the light of Nebbia v. New York, 291 U. S. 502, 54 S. Ct. 505, 78 L. Ed. 940 (1934), and the Sunshine Anthracite Coal case, supra. On the other hand, no matter how great the pressure of "distress" oil, the producers and refiners must not attempt to solve price problems by concerted action, United States v. Socony-Vacuum Oil Co., 310 U. S. 150, 60 S. Ct. 811, 84 L. Ed. 760 (1940).

\textsuperscript{14}Hardwicke, The Rule of Capture and Its Implications as Applied to Oil and Gas (1935) 13 Tex. L. Rev. 391.

\textsuperscript{15}Compare Appalachian Coals, Inc. v. United States, 288 U. S. 344, 53 S. Ct. 471, 77 L. Ed. 825 (1933), with United States v. Socony-Vacuum Oil Co., 310 U. S. 150, 60 S. Ct. 811, 84 L. Ed. 760 (1940). One can only infer that the Sherman Anti-Trust Act (or its enforcement) must be modified, so as to permit price-control under governmental supervision.
natural gas was being blown into the air daily,¹⁶ (and the courts apparently helpless to prevent it¹⁷), far more accurately pictures the situation. Again, one finds a general opinion that occasional examples of the sort hardly matter because, after all, “this nation has half the world’s coal, a third of its iron and a superabundance of oil and gas”¹⁸; in short, the problem is interesting but not important according to that belief. Yet in spite of all uncertainties involved in prediction, it is the consensus of geologists that, with the principal mineral regions already located, the issue as to adequate reserves deserves careful attention.

Perhaps these reasons might be further examined in more detail. As to the waste in recovery of coal, it is only fair to compare American methods with those abroad: in Western Europe, the average loss in working the coal seams varies from five to ten per cent, while the Bureau of Mines estimates that of the United States at thirty-five per cent. In our own total, fifteen per cent was regarded as unavoidable, but the balance, which is to say, roughly one-fifth of the minable coal in place, should have been gotten out, judging from standards of engineering practiced by prudent operators.¹⁸ A leading authority in this field has supplied the economic background for so great an avoidable loss:¹⁹

¹⁶ For the first seven months of 1935, it was actually more than one billion cubic feet a day. See Transcript of Record, page 550, Thompson v. Consolidated Gas Utilities Corp., 300 U. S. 55, 57 S. Ct. 364, 81 L. Ed. 510 (1937).
¹⁸ Rice and Paul, Amount and Nature of Losses in Mining of Bituminous Coal, contained in Report of United States Coal Commission, 1855-1858 (1923). “This meant that the avoidable national loss amounted to 150 million tons a year, left behind under conditions that virtually prevent its being recovered.”
¹⁹ Mr. Howard N. Eavenson, a former president of the American Institute of Mining and Metallurgical Engineers, testified to this effect in the Appalachian Coals case, supra n. 15. See National Resources Board, Report on National Planning, supra n. 7, p. 401. Similarly, Mr. Eavenson has written [Regulation of the Coal Industry (1936) 119 Trans. A. I. M. E. 330, 333]:

“The Bituminous Coal Conservation Act of 1935 should have been called a stabilization act, as, excepting the statement in the preamble of the bill about the conservation of coal, there is absolutely nothing in the law that will conserve bituminous coal resources, although if it becomes profitable to remove coal that is now being left in the mine this may be done. There is nothing in the law to require it, however. Unquestionably many mining companies are now extracting only the cream of their coal, because it is economical to do so, and unless prices advance sufficiently to warrant the increased cost of production, this practice will be maintained. With practically no exceptions, no pillar coal is recovered in the entire state of Illinois, and this practice is gradually increasing in southern West Virginia and Kentucky. In many mines the cost of complete extraction is materially greater than that when the pillars are not
"The depressed condition in the coal business has had a great deal of effect on the waste in the mining of coal. Since the depressed condition of the last seven or eight years, a good many mines in Appalachian territory, — a region where normally the recovery is relatively high, — have found that it is much cheaper for them to lose a very considerable proportion of the coal in the ground than it is to try to mine it. In other words, instead of recovering eighty-five per cent. or more, a number of them have gone to a practice where they will not get ultimately more than sixty to sixty-five per cent., because the ultimate result is cheaper than if they tried to mine a greater amount of coal. I think I could make the broad assertion that there is not a single bituminous mine in the country today that is not mining the very best coal that it has, and the cheapest, and is allowing portions of the mine to get into shape where a lot of the coal never will be recovered, because they cannot afford at present prices to mine it."

Another mining expert has observed that more than 4800 bituminous mines were shut down or abandoned within the last dozen years. While a few of these were actually worked out, it is not likely the great majority of the old pits will ever be completely reopened. One can only speculate as to the vast amount of coal lost here by collapse of roof, crushing of pillars and stumps, or permanent isolation of odd acreages of unmined seams. The existence of reserves of lignite and low-grade bituminous should not obscure the fact of wastage in our best coals.

Analogously, petroleum resources have been mercilessly exploited. It is hardly necessary to mention the usual overcrowding of wells in flush production areas, and the development of these horizons more rapidly than the demand warrants. The operation removed, so that the loss of coal, while harmful from a national standpoint, is economically beneficial to the operating companies. Under present decisions and the division of authority between the National and State Governments, there is absolutely nothing that can be put in an act of this kind that will require the removal of this coal."

20 Alford, Analysis of Bituminous Coal Mines Suspended from 1923 to 1933, Inclusive (1934) 108 Trans. A. I. M. E. 476.
22 The writer has received information as to at least one such instance of excess drilling in a central West Virginia county,—where several deep-wells have recently been drilled into the Oriskany within the distance of a few hundred feet. Not only has there been useless expenditure in getting all these wells down, but the market demand is considerably less than the yield of any one of them. Moreover, at the eastern district meeting of the American Petroleum Institute in Pittsburgh, April 18, 1941, Mr. W. P. Smith, of Charleston, speaking on the problem of well-spacing, urged that "unnecessary crowding of offset wells should be avoided."
of oil wells with improper gas-oil ratio, and common underground losses because of invasion of water into the oil sand are only too familiar in this connection. Consumption of "distress" oil forced on the market by overproduction, along with the premature abandonment of small pumping wells (inevitably consequent from demoralized prices), merely typifies the economic and legal impasse reached by the industry. Negligent and even wanton waste of oil and gas through fire or permitted escape has been thoughtlessly sanctioned by an indulgent public. The result of it all is that seventy-five to ninety per cent of the oil has been left underground in the older fields; and these are now capable of production only at a slow rate by pumping or cautious re-pressuring, or possibly in the end by mining methods. On the other hand, in various foreign countries where the concession was large enough to embrace the entire pool as a single operating unit — as compared with the American common law unit of the separate leasehold — drilling and production have been so conducted that the yield (by flowing) is almost the full theoretical recovery.

Were mineral resources unlimited, these losses might be overlooked, if not forgiven. Unfortunately, geologic and geographic limitations upon additional large developments are becoming fairly definitely understood. Thus, taking a broad survey of the whole position, it is now established that the country is deficient in many minerals essential to national well-being; that aside from building materials, only a few of the minerals (such as coal and iron) exist in quantities sufficient to supply the nation for long periods of a hundred years or more; and that even these very few are considerably more limited as respects higher-grade reserves. If


24 As in United States v. Socony-Vacuum Oil Co., 310 U. S. 150, 60 S. Ct. 811, 84 L. Ed. 760 (1940). And when the East Texas field came in ten years ago, the price of oil fell to less than ten cents a barrel.

25 Instances of serious losses by fire are well-known to the industry. For example, both the El Dorado and Smackover fields in Arkansas were developed in most wasteful fashion, and fires were allowed to continue unchecked. So too in Louisiana, operations on the property of the Ananias Hunting Club burned for weeks.

26 After drilling into extensive gas deposits, Oklahoma operators would sometimes in the past let these wells flow wide-open for long periods, in the vague hope that oil would eventually appear. Under these conditions, gas was looked on as something of a nuisance. Cf. Note (1941) 47 W. Va. L. Q. 211, 212.
one turns then to coal-mining, all the signs point along the same road. The anthracite fields are about thirty per cent exhausted, with its extraction passing into the stage of seriously-increasing costs. Similarly, better seams of bituminous coal have been terribly depleted: by way of illustrations, the Moshannon bed and the Georges Creek Big Vein are substantially worked out.\(^27\) Three generations or so might represent the probable life of the Pocohontas, New River and Pittsburgh seams.\(^28\) Even so as to coal, conditions with respect to oil and gas deposits are much worse. The enormous East Texas production has temporarily blocked the view of the hundreds of dying pools in other areas; but there is little likelihood of great new discoveries in the earlier districts of Appalachian or mid-continent fields. Modern deep-well drilling locally ought not to make one forget the decline in other regions, like the Indiana gas belt. In fact, by considering development and production as identical, the mineral industry has gotten to a place where legislative intervention is gradually becoming a certain eventuality.

It is almost superfluous to consider the common law or the "customary statutes" as adequate for present needs: these have been quite useless in averting those very mineral losses just described. Most assuredly the cold rigid justice of case-law — the one weight and the one measure — has been ineffectual, immature and

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\(^27\) The position has adequately been summed up by Mr. J. D. Francis of the Island Creek Coal Company as follows [56 A. B. A. REP. 702 (1931)]:

"This does not mean that our supply of coal is inexhaustible. While we do have very large reserves of coal, especially west of the Mississippi River, the high-grade, low cost coal measures which furnish 90 per cent of our industrial and domestic supply, are being rapidly exhausted, and within another 25 or 30 years, at the present rate of production, our sources of the better grade, low-cost coal will be 75 per cent exhausted. From a practical standpoint the estimates of reserve coal as made by the Geological Survey for the eastern states should be reduced at least 75 per cent."

See also, Ashley, *Production and Reserves of the Pittsburgh Coal Bed* (1938) 130 TRANS. A. I. M. E. 56.

\(^28\) It is interesting to note, from English data, how early in the exploitation of a mineral resource the stage of increasing cost may arise. According to British geologists, only seven per cent. of the original coal reserves in the United Kingdom has thus far been removed. Yet in the course of winning that seven per cent., British miners have been forced to work at depths as great as 3700 feet, and to work at shallower depths *seams as thin as fourteen inches*. And the British miner then averages only about one-fourth as much in individual production as does his American competitor; accordingly a ton of soft coal here costs but 1.7 hours of labor, in contrast with the figure of 7.5 hours of labor in England. The importance of all this is simply that American mining is now slowly starting down the same long road. *Cf.*, Brief for Government in *Carter v. Carter Coal Co.*, supra n. 13, pp. 15-22 (1935).
uncritical in dealing with complicated broader issues of conservation. To illustrate, when in West Virginia litigation the argument was pressed that lower seams ought to be developed by mining methods which would permit the upper coal to be saved, our court substantially ignored the public interest by insisting on an implied waiver of subjacent support.29 Exactly the same temperate yet sterile approach was followed in a Pennsylvania decision upholding the landowner’s legal right to let the gas from his well escape into thin air.30 To be sure, in instances where there is a contractual relation between parties, the common law has generally devised some sort of a remedy in line with its historic ideal of conservation. Thus it has been held that the lessor may sue the operator for waste,31 with liability for damages caused by water intrusion into the oil sand;32 and conversely the operator may restrict the lessor’s use of flambeau lights33 and install meters to restrict wasteful consumption under the free-gas covenant.34 But failing these relational obligations, judges have clung firmly to quaint medieval tenets of property law: whether the proprietor has absolute title35 to subjacent oil and gas, or qualified ownership,36 or simply the exclusive right on his own premises to capture and reduce these fugacious minerals to possession,37 there is no common law duty on him to utilize mineral deposits so as to avoid injury to others. One can do as he likes with his own land. Making the best of the bad job that case-law has done, the average person (or a lessee) can then live on terms with the neighbors only by excess drilling

29 Continental Coal Co. v. Connellsville By-Products Co., 104 W. Va. 44, 138 S. E. 737 (1927), discussed in Note (1928) 34 W. Va. L. Q. 212. In comparison, read Ross v. Damm, 278 Mich. 388, 270 N. W. 722 (1935) (where the court allowed damages because an adjoining owner, by drilling near the property line, had deprived the plaintiff of his opportunity to take the oil rightfully “his”).


32 See the authorities already cited supra n. 23.


37 Watford Oil & Gas Co. v. Shipman, 233 Ill. 9, 84 N. E. 53 (1908); Morgan v. McGee, 117 Okla. 212, 245 Pac. 888 (1926).
This is not one of the rare occasions in English common law where unexpected transatlanticisms crop up, to modernize and even to civilize an obsolete or artificial rule of property; our American invention of the doctrine of correlative rights has never been voluntarily extended by the courts to take in any new regions of mineral resources. Such a holding might possibly subvert fundamental concepts of title.

The "customary statutes" (prohibiting waste) for the most part merely abate spiteful or wanton losses of oil and gas, where a well should be closed in or plugged in order to protect other industrial investment. In West Virginia, (which is perhaps typical), a half-century of development has been accompanied by enactment of only a few code sections specifying plugging requirements and regulating in rather primitive fashion drilling permits. It is no doubt unfair to blame legislatures overmuch for not taking more drastic steps: until unwritten judicial ideals of conservation had caught up with the scientific fact that limitation of production has definite relation to physical waste, any far-reaching measures would have encountered constitutional obstacles. Moreover, federal anti-trust laws might have stood in the way of isolated state action encouraging industry to conserve resources by restricting

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82 Hubbard, Economics and Well Spacing in Texas (1937) 123 TRANS. A. I. M. E. 163.

39 Occasionally, the English common law as to property rights has been profoundly influenced by the judicial inventions of American jurists. For example the common law ideas of Blackstone as to the appropriation of water from streams were definitely shaken by the "riparian rights" theory of Story and Kent. See Webb v. The Portland Mfg. Co., Fed. Cas. No. 17,328, 3 Summ. Rep. 189 (1838), per Story, J.; and Wiel, Waters; American Law and French Authority (1919) 33 HARV. L. REV. 133. Again, the courts of Massachusetts and New Jersey simply created de novo the "common enemy" doctrine as to surface waters, in the place of the old civil law and common law rule regarding the natural right to surface drainage (from upper land across lower land). The newer doctrine is perhaps now the weight of authority in the United States: cf. Barkley v. Wilcox, 86 N. Y. 140, 40 Am. Rep. 519 (1881). Many similar instances might also be cited.


41 The dates are not arbitrarily chosen, for the first plugging statute was enacted in 1891. See W. Va. Acts 1891, c. 106.

42 W. VA. CODE (1931) c. 22, art. 4, §§ 9-10 and §§ 14-17.

43 Id. at c. 22, art. 4, §§ 2-8 and 11-13.

44 This is precisely what in the "early days" happened in Texas: one regulation after another was held bad—and by good judges. See, as illustration, Constantin v. Smith, 57 F. (2d) 227 (D. C. 1932); Peoples' Petroleum v. Sterling, 60 F. (2d) 1041 (D. C. 1932); and Peoples' Petroleum v. Smith, 1 F. Supp. 361 (D. C. 1932). Hutcheson, Circ. J., wrote the court's opinions in these cases.
yield or maintaining price standards. Up to the last decade or so, therefore, the inadequacy of common law and legislation can hardly be characterized as fortuitous oversight.

In the light of all these facts, it is proper to re-examine the legal position in order to ascertain how far doctrines of conservation may now be achieved by new legislation. The present investigation is concerned only with oil and gas and with coal resources: by setting narrow limits to the study and confining the discussion resolutely to such limits, a sharp-focus survey of regional needs can better be had.

**Statutory Regulation of Oil and Gas.**

In any treatment of legislative efforts for conservation, those dealing with oil and gas are rightly taken up first, not only because the most difficult problems of loss of seriously-depleted non-replenishable mineral resources occur here, but also because within the last few years more advanced statutory expedients have been enacted in this field than elsewhere. Possibly it is easier to waste oil and gas, by reason of the underground factors of gas and water pressure; reservoir energy can so quickly be expended at an excessive rate by too many offset wells; and the ultimate injury to the public interest will prove to such an extent greater. Whatever be the reason, federal and state governments, industry and scientists, and legislators and lawyers have recently shown an unique willingness to collaborate as regards fugacious minerals.

The establishment of the Federal Oil Conservation Board, a decade or more ago, may be considered as a starting point of modern regulatory action. The four-fold mechanism of control devised by that body involved determination of demand and its allocation among producing areas, the cooperation of the principal states in an Interstate Compact, federal regulation of "hot oil," and, finally, enforcement of conservation quotas by local action. It would be well to note briefly how each of these various phases has worked out. As to the first, the prediction of probable con-

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47 MILLER, FUNCTION OF NATURAL GAS IN THE PRODUCTION OF OIL (1929).

48 ELY, OIL CONSERVATION THROUGH INTERSTATE AGREEMENT (1933) 18; WATKINS, OIL: STABILIZATION OR CONSERVATION? (1937) 72.
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Consumption has been made with remarkable accuracy by the fact-finding service in the Bureau of Mines; but the suggested allocation regionally of the production needed to meet components of that consumption has had only the voluntary administrative collaboration of the states behind its enforcement. National planning must eventually find some means of controlling regional yield by federal regulation, if the mineral welfare of the entire country is ever to be achieved. Still, as to the second step, an interstate compact has actually been entered into by a small number of states, through the terms of which these have agreed to enact and enforce conservation measures. But there is no uniform act yet drafted here, nor is there any commitment of the several states to enforce production quotas: voluntary exchange of information by administrative commissions of the jurisdictions involved is probably the most that can be hoped for. When the third expedient of federal assistance in control of "hot oil" is next considered, one must infer that definite progress has here been made. Though the first such effort was held unconstitutional on another ground, the present Connally Act (and its extensions) will amply protect a state's formulation of proration limits. Perhaps a single criticism could be ventured as to judicial treatment of that statute: despite the contraband character of "hot oil," the wrongdoers seem to enjoy court protection of their rights and liabilities as among themselves. Surely the rules as to federal violations no more depend on the type of interests at stake than do the rules of arithmetic.

Obviously under our federal system the fourth proposal of the Federal Oil Conservation Board, (namely, the enactment of adequate state conservation laws), was the most important one; and the jurisdictions of the South and South-west have led the way in carrying it out. What has become necessary is a comprehensive

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50 Panama Refining Co. v. Ryan, 293 U. S. 388, 55 S. Ct. 241, 79 L. Ed. 446 (1935) (the so-called "hot-oil case").
51 In a recent federal case, the litigation dealt with a hot-oil production of some 200,000 barrels involved in a partnership accounting suit. The defense was that the oil was contraband, subject to confiscation, and that there could not possibly be any legal title in the partnership. The court agreed, but held an accounting should be had nevertheless.
52 Anyway one finds a curious old precedent on the other side. In 1725, a bill was filed in the Exchequer (in equity) by one highwayman against another for an account of the profits made in that occupation. After its dismissal the parties accounted to the law. See Mr. Justice Riddell's account, A Legal Scandal Two Hundred Years Ago (1930) 16 A. B. A. J. 422.
statute re-defining waste from every angle of geological and industrial knowledge, requiring pooling of leaseholds where necessary to the proper development of an oil and gas field, limiting the number of drilling operations so as to prevent loss of pressure, permitting regulation of gas-oil ratios in existing wells, prorating production to prevent unmarketable yield, and setting up adequate administrative machinery to enforce all these requisites with continuous reasonable supervision. Such legislation, it will be observed, entails various new statutory concepts of conservation. Primarily, the new laws now apply to fugacious minerals the "correlative rights doctrine," judicially invented for adjusting conflicting claims to underground waters; in effect, each landowner is henceforth guaranteed a reasonable share in the underground oil and gas pool lying beneath his property. Secondarily, as a corollary, the serious evil of excess drilling may gradually disappear when definite restrictions are placed on the number of wells. There will no longer be the existing destructive system with its amazing economic loss, under which competing operators can drill to such a density that the legs of the derricks interlock. Again, prorating of producers presently enters into our legal background as an accepted method of conserving mineral resources. It seems almost unbelievable that only a few years back lower federal courts so consistently rejected this theory, as wholly in conflict with their preconceived ideals of absolute property rights in fugacious minerals. The fact that these very property rights might be drained away, or clear proof that overproduction could eventually destroy the oil horizon, meant very little in their refusal to check the rapid overdevelopment of the East Texas field. This judicial attitude, even if we know it to have been erroneous, went far to justify imposition of drastic measures in that region, when in 1931 oil fell to the ridiculously wasteful price of five cents a barrel. Of course martial law was not the proper remedy for

53 Representative authorities are cited in footnote 40, supra.
56 This was the factual setup in the Santa Fe Springs oil field, in California. See People v. Associated Oil Co., 211 Cal. 93, 294 Pac. 717 (1930).
overproduction; but the origin of the whole trouble lay in the unwillingness of the judges to recognize that prorating merely gave effect to the historic ideal of conservation.

It is important to note in the modern statute the careful provisions that give effect to these legislative policies respecting waste, pooling, drilling and prorating. The definitions of waste will normally include improper use or dissipation of reservoir energy; the locating or operating of wells so as to reduce the quantity ultimately to be recovered from the pool; abuse of correlative rights through disproportionate and unratable withdrawals, causing undue drainage between tracts of land; production in such manner as to bring unnecessary water channeling or coning; an inefficient gas-oil ratio; and the creation of unusual fire-hazards. Additionally, the commission has express authority to regulate the shooting, perforating and chemical treatment of wells; to control secondary recovery methods; and to prevent caving and seepage. As regards pooling, a drilling unit or units is established by commission order for every pool, each unit being the maximum area that can be economically drained by one well, but not in excess of forty acres. The drilling unit's well is put at the approximate center, except where extraordinary conditions of the unit require otherwise; and the producer's just and equi-


60 In general, three factors have been recognized in determining the ratio of prorating production,—allowances per well, potential and acreage. No doubt an adequate formula must take additional factors into account. Meantime, engineers are now developing a new basis, involving acreage multiplied by the index of recoverable oil. That index, in turn, takes into account not only potential but also elements such as permeability, sand thickness, fluidity, the differences between static and flowing bottom-hole pressures, and a number of other factors.

61 The Arkansas Oil and Gas Conservation Law (Act 105 of 1939) is taken as fairly typical of the best recent legislation. Many of its model provisions are likely to be adopted elsewhere.

62 The Declaration of Policy in the new Arkansas statute should be quoted: "In recognition of past, present, and imminent evils occurring in the production and use of oil and gas, as a result of waste in the production and use thereof in the absence of co-equal or correlative rights of owners of crude oil or natural gas in a common source of supply to produce and use the same, this law is enacted for the protection of public and private interests against such evils by prohibiting waste and compelling ratable production."
table share is then that part of the production which is substantially in the proportion of this respective share in the underground pool. Where an established drilling unit takes in separately-owned tracts, their owners may voluntarily integrate their interests; if there is no such agreement between them, the commission may compel unit-development. As far as the number of wells is concerned, there is administrative power to specify the spacing of wells and to mark out the drilling units. The scope of the broad prorating jurisdiction is based on the commission’s duty to prevent waste, although each pool with small wells of settled production must be given an allowance which will not accelerate premature abandonment of these wells. One thus has, in skeleton outline, an example of wise legislative statesmanship that has carefully heeded the best available opinion, geological and industrial alike, for preserving these sub-surface minerals.

Granted all those conservation powers are to be entrusted to a state administrative body, the modern statute likewise provides that a majority of the commissioners be experienced in the development and production of oil and gas. In other words, careful regulation of a highly technical business must be in the hands

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63 Section 14, Paragraph D (Arkansas statute) reads:
"Subject to the reasonable requirements for prevention of waste, a producer's just and equitable share of the oil and gas in the pool (also sometimes referred to as a tract's just and equitable share) is that part of the authorized production for the pool (whether it be the total which could be produced without any restriction on the amount of production, or whether it be an amount less than that which the pool could produce if no restriction on amount were imposed) which is substantially in the proportion that the quantity of recoverable oil and gas in the developed area of his tract in the pool bears to the recoverable oil and gas in the total developed area of the pool, in so far as these amounts can be practically ascertained; and to that end, the rules, regulations, permits and orders of the Commission shall be such as will prevent or minimize reasonably avoidable net drainage from each developed unit (that is, drainage which is not equalized by counter drainage), and will give to each producer the opportunity to use his just and equitable share of the reservoir energy."

64 Section 16, Paragraph B (Arkansas statute) reads:
"Whenever the Commission limits the total amount of oil or gas which may be produced in any pool in this state to an amount less than that amount which the pool could produce if no restrictions were imposed (which limitation may be imposed either incidentally to, or without, a limitation of the total amount of oil or gas which may be produced in the state), the Commission shall prorate or distribute the allowable production among the producers in the pool on a reasonable basis so as to prevent or minimize reasonably avoidable drainage from each developed unit which is not equalized by counter drainage, and so that each producer will have the opportunity to produce or receive his just and equitable share, as above set forth, subject to the reasonable requirements for the prevention of waste."

65 Section 2, (Arkansas statute).
of experts, so that extensive investments will not be needlessly jeopardized. That requirement has recently become increasingly vital, in view of present decisions by the federal supreme court making for administrative finality here. Indeed a wholly new chapter in administrative law seems now to be in the making as regards the oil and gas industry. Heretofore every state regulatory order has had to pass the scrutiny of the three-judge federal court; and with confiscation claimed by the operator, there was trial de novo both on the law and on the facts. It would appear that the extent of federal judicial review has been limited somewhat by the supreme court’s disposition to leave conservation issues to the trained discretion of the expert commission, even in doubtful cases of prorating. Whether this departure from the judicial practice of the past will work out satisfactorily, one can only guess. It suffices meantime to remark the growing tendency to turn over grave responsibilities to such oil and gas commissions.

LEGISLATIVE EFFORTS AS TO COAL MINING.

In years of normal production, avoidable loss in coal mining totals one hundred and fifty million tons a year. Yet the astonishing feature of all this has been the utter indifference of legislative bodies as to prevention of waste. By the Guffey Act of 1937, for example, a single sentence is regarded as adequate to the problem.

"The Commission shall study and investigate the matter of increasing the uses of coal and the problems of its importation and export; and shall further investigate—

"1. The economic operations of mines with the view to the conservation of the national coal resources."

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69 As the regulation did, for example, in Thompson v. Consolidated Gas Utilities, 300 U. S. 55, 57 Ct. 364, 81 L. Ed. 510 (1937), per Brandeis, J.


71 No attempt is made here to analyze all the perplexing questions raised by these decisions, supra n. 66. For discussion, however, see Summers, Does the Regulation of Oil Production Require the Denial of Due Process and the Equal Protection of the Laws? (1940) 19 TEX. L. REV. 1; Davis, Judicial Emasculation of Administrative Action and Oil Proration (1940) 19 TEX. L. REV. 29; Summers, The Rowan & Nichols Cases (1941) 13 Miss. L. J. 417.

72 50 STAT. 89 (§14); 15 U. S. C. A. § 844 (b), enacted April 26, 1937.

Presumably the expectation of Congress was simply that the minimum prices authorized by that federal legislation would amply safeguard the economic well-being of coal operators, so that any issues of conservation might be leisurely studied at some time in the indefinite future. Naturally a prosperous industry can better afford to devote attention to improved methods of mining; and to that extent at least price-fixing was foremost in importance. It is significant, however, that state legislation everywhere displays the same lack of interest more or less in the subject.

West Virginia mining laws are fairly representative of the types one will find as to coal. Measures relating to mine safety are rightfully paramount, and they account for nearly three-fourths of the code sections involved. On the whole, safer mining conditions tend to improved technique in extracting and so aid in greater recovery from the seam, — with the result that these enlightened statutory requirements actually yield in the long run (as an indirect by-product) a certain minimizing of waste. By contrast, the other sections have absolutely nothing to do with efficient utilization of coal: as a matter of fact, those remaining really in one way or another burden the industry. As illustration, one group is concerned with the protection of oil or gas wells that have been drilled through mines, the provision here being a requisite that the coal operator keep a substantial block in place around them. There is of course a way of necessity through the superincumbent strata right on down to the oil or gas pool, though even apart from that considerations of mine safety might justify the legal rule. Nevertheless, the operator does suffer some substantial loss. And analogously, the five feet of coal which must be left untouched along boundary lines, in the absence of agreement otherwise, can never be gotten out. Once more, however, the exercise of the police power is amply supported by the neighboring right of lateral support and an avoidance of boundary disputes. The most recent legislation, that which deals with strip-mining, forces the

71 W. VA. CODE (1931), as amended, c. 22, art. 1, §§ 1 to 13; c. 22, art. 2 §§ 1 to 72 and §§ 82 to 83; c. art. 3, §§ 1 to 2. The provisions of c. 22, art. 4, relative to drilling through coal mines may also be regarded as safety measures.
72 W. VA. CODE (1931) c. 22, art. 4, § 11.
74 W. VA. CODE (1931) c. 37, art. 5.
operator to repair the surface\textsuperscript{76} without reference to the expense entailed thereby; but it may be observed that no such obligation is imposed on similar businesses. In short, the foregoing adequately summarizes mining regulations in the state that produces the greatest yield of bituminous coal.

Legislation in Pennsylvania has even gone the distance of seeking to limit pillar removal, where essential to surface support. Without such a statute, the court there refused to enjoin wrongful cutting of pillars (which might cause subsidence) in violation of any existing right of subjacent support, on the ground that the vital coal industry ought not to be subjected to injunctive process when conducting ordinary mining operations.\textsuperscript{77} It had been estimated that one-fourth to two-fifths of the coal would have to be left in place,\textsuperscript{78} in order to prevent subsidence, and that wastage of valuable mineral resources might often be improvident. Whatever the event, the surface owner would always have the chance to sue in an action on the case at law to collect reasonable damages, were his natural right of support improperly invaded: in a mine community, presumably these damages would be fair all-around. Into the common law background of balancing industrial equities came the Kohler act of two decades ago\textsuperscript{79} forbidding anthracite mining so as to let down the surface under a dwelling house, public building, highway or public utility easement, and this irrespective of a prior express waiver of the claim to subjacent support. Admittedly, the statute destroyed previously-existing rights of property and contract, so that the question was whether the police power could be stretched so far. Reversing the state decision,\textsuperscript{80} the federal supreme court said the act could not be sustained, to the extent that it affected coal mining in places where the right to rob the pillars had been expressly stipulated.\textsuperscript{81} The case held there was no public interest in surface use sufficient to warrant so complete a destruction of the operator's constitutionally protected title to the coal, yet unfortunately neither the majority nor minority opinion adverted to the importance of conserving anthracite. Perhaps re-

\textsuperscript{77} Home Brewing Co. v. Thomas Colliery Co., 274 Pa. 56, 117 Atl. 542 (1922).
\textsuperscript{78} Griffin v. Coal Co., 59 W. Va. 480, 53 S. E. 24 (1905).
\textsuperscript{79} 52 Penn. Stats. (Purdon, 1931) § 661 (1921, May 27, P. L. 1198).
\textsuperscript{80} 274 Pa. 489, 118 Atl. 491 (1922).
enactment of the law by the Pennsylvania legislature in 1937, extending its provisions to bituminous mining, may ultimately furnish an opportunity for judicial discussion of the whole problem of reconciling coal conservation with maintenance of surface facilities in crowded urban areas, through there is evidently a present disposition to slide over it without discussion.

The solution of subsidence difficulties does not lie in a hard-and-fast rule that provides uniform treatment in each and every instance, regardless of the nature and use of the surface and despite the value of subjacent seams. Any such intolerable burden on the industry would ignore the modern notion of efficiently utilizing national resources. A much sounder result has been achieved in the English legislation of a dozen and a half years ago, under which the conflicting claims of nation, landowner and operator have been roughly balanced:

1. The landowner can always maintain or secure the right to subjacent support, if the improved surface be manifestly more valuable than the coal in place. When in this instance the operator were to own a prior waiver of support, he would then be compensated by the other for the loss of his coal.

2. The operator can always assert or acquire the right to let down the surface, (where subsidence would otherwise be unavoidable), if the coal seams were in contrast more valuable obviously than unimproved surface. When here the landowner still had his natural right of support, he in turn would be compensated by the operator for subsidence damage.


State Highway Route No. 185, Schuylkill County (Glen Alden Coal Co.), 14 Atl. (2d) 76 (Pa., 1940).


Where the support to be obtained was for a public building, highway or public utility, the ordinary eminent domain statute, [W. Va. Rev. Code (1931) c. 54] could be broadened so as to accomplish constitutionally such a result in West Virginia. On the other hand, for a group of houses in a neighborhood, the analogy of the system of special assessments in the establishment of a drainage district [W. Va. Rev. Code (1931) c. 19, art. 21] might well be followed: after all, it would be a community benefit and should be feasible. As to the single dwelling-house, condemnation of adequate coal to be left in place might seem to have the vice of “private eminent domain”; in any event, it would be unlikely that such an isolated house could compare in value with the coal resources involved.

This is simply the result obtained by “balancing the equities” in favor of the coal industry, as was done in Home Brewing Co. v. Thomas Colliery Co., supra n. 77. In other words, equitable relief in such instances would be abolished by statute, and the landowner left to his remedy at law,—provided this be possible within Truax v. Corrigan, 257 U. S. 312, 42 S. Ct. 124, 66 L. Ed. 254, 27 A. L. R. 375 (1921).
In other words, provided it is impossible to prevent caving-in through a process of back-filling or hydraulic stowing, the essential test is more or less one of the importance of the respective coal deposits,—assuming, (to use the English statutory clause), "it is expedient in the national interest that the right applied for should be granted." The task is for an impartial commission to apply this flexible standard to the facts of each case and thus achieve reasonable conservation of mineral resources. Unlike the Pennsylvania statute, there is no arbitrary confiscation of a third of the operator's coal without adequate compensation being paid by those directly benefited. And the payment of damages to the surface owner whose right of support is taken away has always been available at common law, were equitable relief denied him.87

However, none of the state laws so far discussed has directly aided the mining industry or specifically promoted the cause of coal conservation. Nor is any comprehensive statute analogous to recent oil and gas regulation now practicable: too many side-issues crop up as to bituminous resources here so that operators and public alike are scarcely ready for drastic legislative interference. On the other hand, certain specific measures might properly be suggested, both with the purpose of indicating advantageous progress for all concerned and perhaps as predicting a likely course of increasing social control. These various isolated proposals concern state acquisition of tax-delinquent and marginal properties, modification of tax-assessment policies, eventual pooling of coal acreages as in the instance of oil and gas leaseholds, future restriction in the number of active operations, provision for governmental assistance in plant facilities and for technical research, and gradual compulsory improvement as to wasteful mining methods. It would be well to take each of them up in order.

As to the first of these, where over an extended period tax-delinquent minerals have continued unredeemed, that very fact is clear proof existing reserves in private hands are more than adequate to the needs of our local and national economy. To infer that a tax-foreclosure proceeding as to such deposits will in the long run increase the state's revenue is commonly an illusion, for normally its ultimate effect is rather to depress the tax-paying ability of other coal-holders. Forcing the properties back into

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87 Normally, the trouble with subjacent support statutes is that legislatures have all too often thought only in terms of the surface, disregarding the numerous instances where coal may have a value far in excess of any subsidence loss.
private ownership simply stimulates the vicious cycle of over-expansion of mining capacity (in order to meet carrying charges on reserve holdings), with its consequent evils of capital loss, intermittent employment and waste in resources. Seemingly a much wiser course would be for the state to make every effort to keep long-delinquent coal lands out of production until that future time when they are actually needed, and then to lease them out on a royalty basis, after the manner of federal domain exploitation under the Mineral Leasing Act. The Public Land Corporation of West Virginia now possesses certain authority to buy in at the circuit court sale for the school fund, where no private bid is offered equal to the total of the outstanding delinquency. Its powers might be broadened somewhat along conservation lines, with the general idea of keeping down overproduction in this field. Closely allied to the foregoing is a recent suggestion for the federal government to purchase and retire some of the marginal mines and (to a very limited extent) specified coal properties at present privately held. But it will be noted that the plan involves no wide extension of public ownership of coal, nor for that matter any attempt at federal operation of mines: the thought is merely the creation of an eastern coal reserve consisting of selected blocks of acreage, to be administered in much the same fashion as western public lands. On the whole, the coal industry has favored that notion; and if it meets the thorny issues of surplus capacity and stranded mine-workers, the favorable results obtained to date through other federal leasing would appear to demonstrate its feasibility.

The second proposal for modification of tax-assessment policies is quite familiar to those who have studied forest-taxation problems. The background is the ordinary property tax both on active operations and on mineral reserves, these latter being assessed annually for indefinitely long periods before coming into

88 W. VA. Code (1931) c. 37, art. 2A.
89 The circuit court proceedings for school fund sales have now been amended and re-enacted by the 1941 legislature, in new form as c. 11A, art. 4 of W. VA. REV. Code (1931) (effective March 6, 1941), W. Va. Acts 1941, c. 117.
90 The proposal is briefly touched upon in NATIONAL RESOURCES BOARD, REPORT ON NATIONAL PLANNING, supra n. 7, p. 423.
91 See Note (1940) 33 HARV. L. REV. 1018. A study of West Virginia aspects of the issue as to forest-taxation is now under way in the School of Forestry of the College of Agriculture, West Virginia University. Cf. OHIO GEN. CODE ANN. (Page, 1936 and Supp. 1939)), §§ 5554.1 to 5554.8; Hall, THE FOREST-TAX PROBLEM AND ITS SOLUTION SUMMARIZED, U. S. Dept. of Agriculture Circular No. 353 (1935).
production; sometimes the assessment has a higher proportion of true value than for other classes of property.\textsuperscript{92} And in addition, the operator meets with one or more of a series of special taxes on minerals that are termed tonnage taxes, severance taxes, royalty taxes, occupation taxes and corporate income taxes. The cumulative effect of all this is to burden the mining industry with a load of taxation often far heavier than that for ordinary business. Possibly one reason for any such currently-popular discrimination is the growing interest in natural resources, along with an intuitive feeling that the public has certain special rights here. Moreover, a distinction less just than most distinctions are has to do with the ownership of many of the larger properties from the outside, so that local taxing bodies badly in need of governmental revenue find it hard to exercise restraint. Of course these pleas are worthless alike, yet in fact coal companies are driven to open mines, when only to provide income to salvage their investment from tax delinquency. The consequence may be overdevelopment of mine capacity, selective mining with attendant loss of low-grade material, handicapping of orderly development, or even permanent destruction or locking up of important deposits.\textsuperscript{93} Under these circumstances, a sound approach to the question would be the adjustment of property assessments to a scale that might make it more feasible for active operators to carry the reserves really necessary for prudent investment in mine plant, with accumulations beyond that point effectively discouraged. Thus there would be considerable reduction in assessment on actual production: in comparison, reserves owned in excess of that reasonable ratio set might be subjected to unreduced assessments, and perhaps even to a special mortmain tax.\textsuperscript{94} After all, experience has amply demonstrated that excessive taxation defeats conservation. Where only a financially-stable company can afford competent engineers and adequate supervision, and where coal wastage is often caused by lack of engineering control, surely tax authorities should have these matters in mind. The fact that captive mines, freed from

\textsuperscript{92} Such a practice was properly rebuked in Cumberland Coal Co. v. Board of Revision of Tax Assessments in Greene County, Pa., 284 U. S. 23, 52 S. Ct. 48, 76 L. Ed. 146 (1931).

\textsuperscript{93} These evils are adequately discussed in National Resources Board Report on National Planning, \textit{supra} n. 7, pp. 426-428.

\textsuperscript{94} A license tax on corporate holdings of more than ten thousand acres of land was provided for in W. Va. Code (1931) c. 11, art. 12, § 66. The analogy might be employed here. However, care must be taken in all legislation not to transgress the constitutional policy declared by the tax limitation amendment of 1932.
the extreme pressure of destructive competition, usually achieve better results in extraction has unquestionable significance in determination of assessment practice.

The eventual pooling of coal acreages, the third proposed measure, will become legislatively and constitutionally proper on clear proof that consolidating operations not only permits efficient sub-surface development but also avoids perpetual loss of small "island" areas of better-grade seams. Just as pooling oil and gas leaseholds is an inevitable necessity in developing fugacious minerals, so the compulsory unifying of mining projects must ultimately come about if conservation principles are to be followed through. It is unnecessary to dwell upon technical advantages of large-scale workings, or upon considerations of mine safety which flow from centralized supervision. Continued existence of many little mines in any region — a futile sacrifice of the unities of time and place — can only make for waste in neighboring coal, loss in actual extractive methods employed by the operator and financial injury in hand-to-mouth marketing. No doubt pooling is relatively a long way off; perhaps the industry will hardly be ready for so drastic a regulation until the law of diminishing returns begins to be felt, and until an aroused public sentiment insists on minimizing avoidable wastage. Some years ago, a Pennsylvania court held that rights of eminent domain could not be conferred on a private business like coal mining; enforcement of the federal bituminous coal act now typifies the extent to which that industry is today "affected with a public interest." Pooling is simply an economic expedient that almost certainly lies ahead in the future, when competent administrative machinery can be made available for the industrial protection of small companies and large ones alike.

A future restriction in the number of active operations, like the control over drilling exercised under oil and gas statutes, may also be anticipated in any planned program of bituminous

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95 Cf. British Coal Act of July 29, 1938, (1 & 2 Geo. VI, c. 52) § 47.
96 Pooling of coal operations may in the future become constitutionally valid on the same basis as pooling of oil and gas leaseholds. See, as to the latter, Vessey, *Compulsory Pooling of Adjacent Tracts into Drilling Units, Section of Mineral Law, American Bar Association,* (paper read at 1938 Cleveland meeting); Walker, *The Problem of the Small Tract under Spacing Regulations* (1933) 57 Proc. Tex. Bar Ass'n 157; and Summers, *Legal Rights Against Drainage of Oil and Gas* (1939) 18 Tex. L. Rev. 27.
98 In re Poland Coal Co.'s Case, 58 Pa. Super. 512 (1914).
99 As, for example, under the Arkansas statute, section 14 B.
production. This fourth step (already approved in England)\textsuperscript{100} will prevent premature abandonment of marginal mines before being completely worked out; and with its halt on overexpansion steadier industrial conditions are likely to ensue, increasing thereby the percentage of extraction. Much of the present waste is obviously due to irregular and intermittent working, because pillar recovery must depend on maintenance of a regular break-line and systematic schedule of mining. Presumably some sort of interstate compact or federal allocation of quotas will have to be devised, however, before such a type of regional restriction can be fully tried out. Briefly, the theory here is simply that coal mining is not an ordinary business which any one may undertake: the initial investment is too heavy and the risk of loss too great. Hence with the danger of improper exploitation of mineral resources so menacing, only a carefully-limited number of large-scale operators with ample capital investment ought to be permitted to engage in it.\textsuperscript{101}

A good example of governmental assistance in plant facilities is presented by the new Illinois statute permitting county authorities there to operate coal-processing plants for the preparation and treatment of production from nearby mines, in order to render it more marketable.\textsuperscript{102} Similar provision for research, (which accompanies this fifth suggestion), should be generously formulated by federal and state governments, so that the industry will obtain further benefit from impartial scientific and technological advice. If skillful geologists, chemists and mining engineers are able to locate undiscovered sub-surface minerals, — to invent efficient methods for their removal, — and to reduce wastage of resources to an unavoidable minimum, then surely public assistance should sponsor their investigation. It is clearly unfair to expect the whole effort to be underwritten by the heavily-burdened bituminous industry which has neither the surplus capital nor the leisure for pure research; and in addition, the direction of the study ought to be towards conservation, a subject in which the operator may have

\textsuperscript{100} I & 2 Geo. VI, c. 52, § 47 (1938).
\textsuperscript{101} Cf. Discussion (Mr. H. N. Eavenson) in (1936) 119 Trans. A. I. M. E. 391:

"The only thing that I can think to do is to consolidate as many of these plants as are fit to survive into larger units where they can be taken care of and the charges absorbed, then shut down many of them and run the remainder at the most economical rate that can be devised. I think that is going to happen whether it is done by law or otherwise."

only academic interest. Meantime, one may hope the bituminous coal administration will be able to carry out the mandate of that law as to investigating "economic operation of mines." 103

Finally, improvement of wasteful mining practices must constitute the ultimate goal for which the industry as well as the nation will be gradually striving. After thorough research has been properly undertaken by men of "wide horizons and an infinite capacity for learning," into what were thought reasonable standards of extraction as indicated by better mining methods prevalent, definite policies of coal conservation might from time to time be offered. The sanction of aroused public opinion could thereafter be sought, for these policies would naturally be recommended to owners for incorporation into coal leases and to operators for adoption by their engineering staffs, and probably to state conservation departments for due publicity. If eventually, both in deference to that public opinion and to enlightened self-interest of the industry, most operators were to acquiesce in these modern concepts of conserving mineral resources, statutory formulation could be sought along with flexible administrative regulations (for treatment of the more localized phases). In this step-by-step manner, all might sooner or later fall into line with this general principle of national welfare.

Nevertheless, a warning should here be added against undue interference with the industry's reasonable discretion as to ordinary details of active operations. While standards of prudent working might someday be phrased in flexible departmental orders, every effort ought to be made to guard against any danger of

103 15 U. S. C. A. § 844 (a) (1). Two matters in particular might be investigated. One is the present royalty provision in coal leases, through which the operator pays only on a tonnage-royalty basis. In consequence he mines out merely the better and more accessible parts of the seam (or seams). The operator who acquired the coal in fee will more likely take it all out, since the loss is his own where any coal should be left in place. To increase removal and thus utilize natural resources to the maximum, possibly royalty should be put wholly on an acreage basis; then the lessee will be the more inclined to get his money's worth, since he is in effect buying these acres of coal. The other suggestion has to do with coal "islands" left in place, where the surrounding seam has been worked out. Perhaps a legislative arrangement could be devised for the owner of the "island" to have some access, in the nature of a way by necessity, across or under the mined property over to his land-locked minerals. The justification for such a statutory device might be the prevention of serious waste: its feasibility, however, would depend on the actual cost of leaving any mine facilities or tunnels for the "island" owner's reasonable use. Of course if there were statutory pooling, no easement of the sort would be needed. As illustrative of scientific research now in progress, see McNary, Investigation of Mine Roof Deterioration, (paper read before American Mining Congress, Cincinnati, Ohio, May 1, 1941).
over-hasty intervention by the expert with no real familiarity as to certain actual mining needs. The great advances in mineral development have been effected mostly by private initiative, and the harassed operator is usually held entitled to the benefit of the doubt. It would be exceedingly disadvantageous therefore, if minute particulars of the mine's development (not concerned with safety) were to be supervised by a stranger. For example, in the present state of knowledge, the conservation authority should hardly be able to insist on a longwall operation, modified or unmodified, and to specify its nature to be advancing or retreating, or to require the room and pillar method, or a panel arrangement, when the mine engineers believed variation desirable. On the recovery of pillars the official might think the pocket and stump method best, the operator wanting an open-end or block method; or in choice of type of cutter and loader, or of scraper and conveyor, the company might prefer to have entire freedom. Surely in coal mining, if anywhere, the historic ideal of conservation can never be allowed to submerge completely industrial ingenuity.

From the foregoing survey of conservation issues as to coal, oil and gas, various conclusions may fairly be drawn. First of all, the common law cannot alone accomplish the endless task of reducing avoidable waste. Our legal precepts now scarcely envisage any doctrine of preserving mineral deposits; the technique of judges is limited to the course of justice in private litigation and is unsuited to administrative adjustment of unit drilling or pillar removal; and the received ideal of the common law — the philosophy behind it all — has had until recently the theory of developing a new country's abundant resources, rather than the old English concept of national welfare in each instance where essential supplies were scarce. Another conclusion might be that the present stage in our legal system is one of isolated and inadequate state

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104 Lawall, Given and Kennedy, Mining Methods in West Virginia, Research Bulletin No. 4 (1929), Engineering Experiment Station, West Virginia University. As to administrative regulation, see Hardwicke, supra n. 59, p. 216: "As Landis points out in Chapter I of his book, The Administrative Process, there is a natural tendency for an aggressive administrative agency to become a sort of super Board of Directors for the industry, performing many of the functions of management, yet with few of the responsibilities." This is in paraphrase the view expressed by the majority in the second Rowan & Nichols case, supra n. 66, (61 S. Ct. 343, 346): "An insight and aptitude [in an administrative body] which can hardly be matched by judges who are called upon to intervene at fitful intervals." The minority opinion (in the first case) characterized such a judicial hands-off policy as directly contrary to the practice that had been established under the due-process clause (60 S. Ct. 1021, 1026).
legislation. If it is necessary (and beyond question the need exists) for existing abuses to be corrected by proper statute, we will then find that none of the great petroleum-producing states has wholly complied with implications of the interstate pact, though considerable progress has of course been made. Again, it would further appear that increasing governmental regulation of every sort lies ahead for the mineral industries, and in particular for oil and gas producers. If there were added to the recent conservation law106 the Guffey act type of price-fixing, it would indeed be difficult to distinguish that business from a public utility classification:107 no doubt many of the legislative devices as to oil and gas will eventually find their way over into the coal field, and perhaps the converse may prove true. In any event, the burden of national preparedness will inevitably bring with it growing supervision of these industries,108 and it is difficult to guess where the final line can be drawn.109

Summing up the course of conservation within the last decade or two, one has to recognize a very considerable advance in theory as to the scope and purpose of modern regulation. Statutes tend to adopt almost a sociological attitude, not only in their definition of waste itself but also by seeking improvement in the machinery of legal control. And no less important, legislatures have avowedly chosen to cooperate with industry and science in attempting to solve all these difficult problems. It has long been claimed that while the progress of civilization is favorable to complete freedom, the maxim must be limited by many exceptions. Conserving mineral resources is then such an exception, established by sheer necessity of national welfare.110

106 A typical statute of the modern (Arkansas) type is meant here.
108 Unquestionably, problems of heavy taxation will directly or indirectly lead to increased federal control over these industries, as indeed over all businesses. The nation's interest in adequate governmental revenue must temporarily at least entail further public intervention into private enterprise.
109 The British have now gone to the other extreme by adopting the policy of government ownership of petroleum resources (24 & 25 Geo. V, c. 36) and of coal (1 & 2 Geo. VI, c. 52, §§ 2 and 3).
110 Under date of May 31, 1941, the Secretary of the Interior has been designated by the President to serve as petroleum coordinator for national defense. In the President's letter of appointment, specific reference was made to the following problems of conservation:
1. "The proper development, production and utilization of those reserves of crude oil and natural gas that are of strategic importance both in quality and location.
2. "The elimination of the drilling of unnecessary wells in proven fields and of other unnecessary activities and equipment."