
4.

Coordinating Mineral Activities

Coordinating Mineral Activities

The laws governing mineral exploration, development, and production on **Federal land have significant** gaps in coverage, treat physically similar lands or mineral deposits differently, and contain many provisions that unnecessarily cause considerable uncertainty and cost.

Access to Federal land for mineral activity is uncertain under all the mineral laws. Even after access has been obtained, tenure for exploration is highly insecure under the Mining Law, and tenure for development and production is uncertain for all minerals under the Mining Law and for nonfuel minerals under the mineral leasing laws.

Tenure conditions, including payment requirements, are insufficient in themselves to assure diligent exploration and development or proper conservation of mineral resources. The patchwork system of mineral laws also impedes multiple-mineral exploration, development, and production.

A. Existing Laws for Different Areas and Minerals

1. Overview

Chapter 3 traced the historical development of the principal Federal onshore mineral laws in the context of overall Federal land policy. For more than 100 years, since the middle of the 19th century, mineral laws have been enacted in response to various goals, problems, and pressures. Different provisions within the same law or in different laws were drafted for land in different States, for land acquired by different methods, for different minerals, or for different geologic configurations of the same mineral. The resulting collection of laws contains significant gaps in coverage, treats physically similar lands or mineral deposits differently, and otherwise makes distinctions that are difficult to defend or apply. (See table 4. 1.)

This chapter explores the problems involved in achieving efficient and equitable mineral activities under the existing laws, focusing almost exclusively on the mineral activities themselves. The problems involved in coordinating mineral activities with nonmineral activities will be left, with only a few exceptions, for discussion in chapter 5.

The three principal mineral disposal systems for onshore Federal land are the Mining Law of 1872,¹ the Mineral Leasing Act of 1920² and related leasing laws, and

¹30 U.S.C. § 21 et seq. (1976).

²30 U.S.C. § 181 et seq. (1976).

Table 4.1 —Principal Laws Governing Disposal of Minerals on Different Areas of Federal Onshore Land

Federal onshore land areas	Minerals					
	Coal, gas, oil, oil shale, phosphate, potash, sodium	Sulfur	Native asphalt, tar sands	Geothermal steam	Common varieties of sand, stone, gravel, pumice, pumicite, cinders, clay	All other minerals "hardrock" minerals)
Public domain in						
La., Kans., Mich., Minn. (except national forests), Mo., Okla. (except Indian land), Wisc.	1920 Mineral Leasing Act	No applicable law	1920 Mineral Leasing Act	Geothermal Steam Act	Surface Resources Act	No applicable law
Minn. national forests and certain other areas	1920 Mineral Leasing Act	Special leasing laws	1920 Mineral Leasing Act	Geothermal Steam Act	Surface Resources Act	Special leasing laws
Louisiana and New Mexico	1920 Mineral Leasing Act	1920 Mineral Leasing Act	1920 Mineral Leasing Act	Geothermal Steam Act	Surface Resources Act	Mining Law
All other areas	1920 Mineral Leasing Act	Mining Law	1920 Mineral Leasing Act	Geothermal Steam Act	Surface Resources Act	Mining Law
Acquired land in						
Most national forests and certain other areas	Mineral Leasing Act for Acquired Land	Mineral Leasing Act for Acquired Land	Reorganization Plan No. 3 of 1946	Geothermal Steam Act	Surface Resources Act	Reorganization Plan No. 3 of 1946
All other areas	Mineral Leasing Act for Acquired Land	Mineral Leasing Act for Acquired Land	No applicable law	Geothermal Steam Act	Surface Resources Act	No applicable law

the Surface Resources Act of 1955. The distinctions among the minerals covered by the three systems, and the problems caused by these distinctions, are discussed in the following two subsections and in subsection F(1). The remainder of the chapter focuses in detail on the provisions of the Mining Law and the various mineral leasing laws.

2. Leasable Versus Locatable Minerals

One of the major distinctions in the current laws is the division between those minerals that are leased under the mineral leasing laws and those that are located under the Mining Law. Generally, the fossil fuel minerals (oil, gas, coal, oil shale, native asphalt, solid and semisolid bitumen, and bituminous rock), fertilizer and chemical minerals (phosphate, potash, sodium and, in Louisiana and New Mexico only, sulfur), and geothermal resources are leased, while all other uncommon-variety minerals (usually referred to as "hardrock" minerals) are located. Under the leasing laws, the Government retains title to the land and may allow mineral activities by private applicants on payment of rentals and royalties. Under the Mining Law, private parties can ex-

³⁰ U.S.C. §§ 601, 611 (1976).

³¹ See table 4.1 for the many exceptions. The major exception is the leasing of hardrock minerals on acquired land.

plore for, develop, and produce minerals on Federal land and acquire title to the land without obtaining permission from the Government and without paying rentals or royalties.

The division between those minerals that are generally leasable and those that are generally locatable is more a matter of history than of geology. At the beginning of the 20th century, all minerals other than coal were locatable under the Mining Law. Coal was in a sense also locatable, because coal land was entered and purchased rather than being leased. The fossil fuel, fertilizer, and chemical minerals were made leasable in the 1920's, primarily because of their critical importance to the Nation for the production of energy, food, and explosives. Conservationists were concerned that these strategic minerals might be monopolized and wasted if they remained subject to uncontrolled disposal under the Mining Law.

Although almost all the newly leasable minerals were then being developed from bedded deposits (e.g., coal) or pools (e.g., oil) and thus were usually easier to find than many of the minerals that remained locatable (e. g., gold or silver in veins), this distinction does not appear to have determined which minerals were made leasable. For example, surficial placer deposits and bedded iron deposits remained locatable.

The types of deposits being explored for and developed today offer even less support for a distinction between locatable and leasable minerals based on geologic characteristics or on any associated difficulty of discovery. Table 2.5 in chapter 2 lists most of the known mineral occurrence types (excluding geothermal steam and common-variety minerals such as limestone, common clay, and sand and gravel). These types are divided into four general categories of geologic configuration—surficial, stratabound-extensive, stratabound-discrete, and discordant. The leasable minerals generally are found in surficial or stratabound-extensive geologic configurations, but also occur in the more-difficult-to-find stratabound-discrete and discordant geologic configurations—e.g., oil and gas, trona (sodium), sulfur, and phosphate. The locatable minerals are scattered throughout all four geologic configurations, with some (e. g., copper and gold) occurring in all four and many others occurring in three of the four.

Thus, the distinction between leasable and locatable minerals is not necessitated by their respective modes of occurrence. The distinction is also difficult to support on other bases. For example, it is sometimes argued that the locatable minerals require expensive processing and fabrication prior to ultimate use, while the leasable fuel and fertilizer minerals do not. But many locatable minerals do not require extensive processing or fabrication, while some of the leasable minerals do for at least some of their major actual or contemplated uses (e. g., plastics from oil and gas, or synthetic fuels from coal and oil shale). Moreover, it is unclear why differences in processing requirements and costs should dictate two separate mineral disposal systems rather than, for example, the use of net rather than gross royalties to account for the differing costs.

If there is no geologic or economic reason for the distinction between leasable and locatable minerals, perhaps they should be combined under a single disposal system, whether that system be a location system, a leasing system, or some other system. Two separate systems inevitably create confusion, require more administrative machinery, and raise coordination problems, even when there is a clear division between them.

The problem is exacerbated when, as is the case with the locatable/leasable distinction, there is no clear division. Minerals generally occur in chemical combination, rather than in pure form. Sodium, for example, never occurs in nature by itself, but always in combination with some other element—e.g., sodium chloride (salt). And minerals, in pure or combined form, rarely occur alone but rather are found associated with other minerals. Thus, it is often doubtful under present law whether a particular mineral or mineral deposit is locatable or leasable. The uncertainty increases as improved mineral technology makes it possible to extract valuable ores from complex compounds and to recover valuable coproducts and byproducts from material formerly treated as waste.

Alunite, a hydrous potassium aluminum sulfate compound, illustrates the problems raised by compounds and associated minerals. Alunite contains both potassium, a leasable mineral, and aluminum, a locatable mineral. Should it be treated as leasable or locatable? The Department of the Interior has held that it is leasable because it contains potassium. And, in fact, the Mineral Leasing Act provides for leasing of all “chlorides, sulphates, carbonates, berates, silicates, or nitrates” of potassium⁵ or sodium.⁶ But, granting that alunite by itself is leasable, what is the status of deposits where alunite is associated with locatable minerals—e.g., alunite in porphyry copper deposits, which often contain a higher quantity of potash (in the alunite compound) than copper, but are more valuable for the copper? In a similar situation, a special law, now expired, was needed to permit location of uranium associated with lignite (coal) deposits.⁷

Similar problems have occurred recently with dawsonite, bentonites, zeolites, and feldspars, to name but a few instances.” Such problems, which create considerable uncertainty and litigation, or at best duplicate filings under both the Mining Law and the Leasing Act for the same deposit, can be expected to multiply in the future. The Multiple Mineral Development Act⁸ does not solve such problems, as it is inapplicable to leasable and locatable minerals that are so closely intermixed as to make it impossible to extract one without extracting or substantially disturbing the other. ’()

3. Common Versus Uncommon Variety Construction Minerals

In 1955, common varieties of the so-called construction minerals—sand, stone, gravel, pumice, pumicite, cinders, clay, and other mineral materials—were removed from location under the Mining Law and made subject to disposal by competitive sale, primarily to prevent locators under the Mining Law from obtaining title to Federal land for nonmineral purposes. ” However, the distinction between common and uncommon varieties of these minerals has proved difficult to apply in practice and has engendered much confusion and litigation. ’z Moreover, there are times when prospecting is

⁵30 U.S.C. §281 (1976). The Act also provides for discretionary development of similar associated sodium, magnesium, aluminum, or calcium compounds, but states that mineral deposits in fissure veins ordinarily subject to location under the Mining Law shall continue to be subject to location despite the presence of potash therein. *Ibid.*, § 284.

⁶*Ibid.*, § 261.

⁷69 Stat. 679 (1955), expired Aug. 11, 1975.

⁸See, e.g., Twitty, Sievwright, and Mills, *Nonfuel Mineral Re-*

sources of the Public Lands: Legal Study 264-265, 972 (1970) (prepared for the Public Land Law Review Commission) (hereinafter cited as *PLLRC Nonfuel Legal Study*); *United States v. Union Carbide*, I.B.L.A. 75-29 (1977).

⁹See ch. 3, subsec. D(6).

¹⁰*PLLRC Nonfuel Legal Study*, at 972, citing U.S. Department of the Interior, Solicitor’s Opinion M-36764.4357 (Dec. 4, 1968).

¹¹See ch. 3, subsec. D(5).

¹²*PLLRC Nonfuel Legal Study*, at 268-280, 1092, III-36 to 38.

needed to find common-variety minerals, and competitive sale in such instances may be inappropriate. The distinction between common and uncommon varieties would not be necessary if all minerals were disposed of under a system (leasing, location, or whatever) that retained surface title in the Federal Government.

B. Obtaining Access to Federal Onshore Mineral Land

1. Government Control Over Access

One of the basic distinctions, in theory at least, between the Mining Law and the various mineral leasing laws is that any person can at any time enter on Federal land subject to location under the Mining Law and locate a mining claim without obtaining permission from anyone, while access to Federal land subject to mineral leasing is at the discretion of the Secretary of the Interior, who may refuse to issue a permit or lease for practically any reason,¹⁵ or delay a decision on access for an indefinite period.

However, until recently, the Secretary's discretion under the mineral leasing laws was routinely exercised in favor of mineral development. The policy of the Department of the Interior was to issue permits and leases on request, with occasional exceptions such as the moratoriums on issuance of coal and oil and gas permits and leases in the early 1930's.¹⁵

Because of rising concern about the availability and protection of nonmineral resources on Federal land, the issuance of permits and leases is no longer automatic and, in fact, has nearly ceased for most of the leasable minerals.¹⁶ This problem is discussed more fully in subsection E(2) of chapter 5.

The change in public and agency attitudes and concerns has affected not only discretionary access under the leasing laws, but also the nondiscretionary right of access under the Mining Law. As is shown below, no location under the Mining Law creates any rights against the Government until an actual discovery of a valuable mineral deposit has been made on the located land. Hence, almost any location under the Mining Law can be nullified by withdrawing the land involved from the operation of the Mining Law before the mineral explorer has made the required discovery, even though substantial time and effort may have been expended staking and exploring the land.¹⁷ By 1976, the percentage of Federal land withdrawn from location under the Mining Law was almost double that withdrawn from mineral leasing, if only normal with-

¹⁵The refusal cannot be arbitrary or capricious. Moreover, the Secretary may have no discretion to refuse to issue prospecting permits for sulfur, since the relevant section of the law, unlike similar provisions for the other leasable minerals, authorizes and directs the Secretary to issue a prospecting permit "under such rules and regulations as he may prescribe" to any qualified applicant. 30 U.S.C. § 263 (1976). But the section applies to the public domain in Louisiana and New Mexico only. Sulfur is locatable under the Mining Law on the public domain in other States, and on acquired land it may be leased only with the consent of the land

management agency. 30 U.S.C. § 352 (1976).

¹⁶PLLRC *Nonfuel Legal Study*, note 8, at 730.

¹⁷See, e.g., 54 L.D. 350, 351 (1934) (coal moratorium).

¹⁸*Mining Congress J.*, November 1977, at 99-100.

¹⁹An example is the withdrawal of 26,927 acres of Federal land in western Utah's Deep Creek Mountains to protect rare wildlife and plants, archeological sites, and the water supply for a farming community from proposed uranium prospecting, for which mining claims had already been located. Sierra Club, *National News Report*, May 27, 1977.

drawals are taken into account (that is, omitting the unique situation posed by the Alaska Native Claims Settlement Act).¹⁸

Even on land not withdrawn from location under the Mining Law, access may be blocked or subjected to lengthy delays pending environmental studies, or may be so severely restricted as to make access impracticable, under surface use regulations such as those adopted by the Forest Service. For example, the mining industry asserts that the Forest Service mining regulations are so stringently enforced in wilderness and wilderness study areas as to discourage any prospecting or development.¹⁹ By 1976, the amount of land highly restricted with respect to activities under the Mining Law equaled almost 45 million acres, which was more than half the amount similarly restricted with respect to mineral leasing. The total amount of land withdrawn or highly restricted under the Mining Law was slightly more than that withdrawn or highly restricted under the mineral leasing laws²⁰ (again, omitting the unique Alaska withdrawals). Thus, the distinction between access under the Mining Law and access under the mineral leasing laws is not as clear in practice as it is in theory.²¹

Two significant differences remain, however. First, Government inaction will suffice to deny access under the leasing laws (e.g., “sitting” on an application), whereas positive Government action ordinarily will be required to deny (cut off) access under the Mining Law. Second, access under the Mining Law is often cut off after being initially established, rather than blocked from the start as under the leasing laws. Cutting off access under the Mining Law may result in the waste of substantial exploration expenditures. It may also occur too late to prevent significant damage to surface resources (and to the personal security of private owners if private surface is involved).²²

2. Treatment of Known Mineral Areas

The Federal mineral disposal laws also differ in their treatment of known mineral areas—areas where the character and extent of mineralization are known or can be estimated with a reasonable degree of confidence. The Mining Law makes no distinction between known and unknown mineral areas. Mineral rights are acquired on either type of area by the first person to locate and perfect a claim to the area. The mineral leasing laws do distinguish between known and unknown mineral areas. Mineral rights for unknown mineral areas are granted to the first qualified applicant, while mineral rights for known mineral areas are assigned through competitive bidding.²³

The primary reason given for distinguishing between known and unknown mineral areas is revenue. When the mineralization of an area is already known, the Government can auction off the mineral rights in order to receive maximum compensation for the removal of its minerals. If the rights were instead given to the first applicant, he could and often would immediately sell those rights for a windfall gain without any ex-

¹⁸Ch. 5, sec. G.

¹⁹App. B, subsec. H(1)(b).

²⁰Ch. 5, sec. G.

²¹Access to Federal mineral land for exploitation of the common variety construction minerals is, as with the leasable minerals, subject to the discretion of the Government agencies.

²²See ch. 5, subsec. D(8).

²³See subsecs. C(3)(a) and D(3)(a).

All common variety construction minerals are subject to disposal only through competitive bidding or, in certain situations, negotiated sale. 30 U.S.C. § 602 (1976). Free use by public bodies is also authorized. *Ibid.* § 601.

penditure of funds or effort in exploring or developing the property. Actually, the windfall gain would exist even if he retained the rights himself, but the unfairness of the gain is more apparent when he immediately sells the rights that he has acquired free of charge.

When the mineralization of the area is not known, the only thing the Government can sell is the possibility of a mineral deposit—a possibility, in most instances, comparable, at best, to a 10 or 20 percent chance of successfully discovering a mineral deposit of unknown quality and size. The probabilities can be improved by auctioning off very large tracts of land, containing several thousand square miles each, as is done by many foreign countries. But such an approach favors the largest mineral companies and excludes participation by smaller firms and individuals. It would not only run counter to our traditional commitment to equal opportunity for small firms and individuals, but it would also probably result in less intensive exploration of the area, because only one firm would be engaged in exploration rather than many competing firms and individuals searching for different types and sizes of mineral occurrences. On the other hand, without some such arrangement, there often would be few if any bidders at an auction of an unknown mineral area. Any bids that were received ordinarily would be nominal, and they probably would be outweighed by the administrative costs of conducting the auction. Moreover, if the auction process were initiated for unknown mineral areas by private industry nominations, the nominee of an area would risk attracting the interest of other explorers who might outbid him after he had spent thousands or millions of dollars selecting the target area through regional appraisal and reconnaissance.²⁵

For these and other reasons, it has generally been thought that known mineral areas should be disposed of through competitive bidding, while unknown mineral areas should be granted to the first explorer willing to undertake detailed exploration.

Nevertheless, there is no such distinction under the Mining Law. Historically, this omission can be explained by the policy of free disposal of Federal land that prevailed at the time the law was enacted.²⁶ Practically, the omission has not aroused much concern since the passage of the Mineral Leasing Act of 1920, which applied the distinction to the fossil fuel and fertilizer minerals, but left the generally more discrete and harder-to-find hardrock deposits subject to location under the Mining Law. Two factors, however, may combine to make the lack of the distinction in the Mining Law more troublesome today. First, exploration for hardrock minerals is increasingly focusing on low-grade disseminated deposits as a result of improved technology and the growing scarcity of high-grade discrete deposits.²⁷ Second, expanded and more intensive Government mineral surveys continue to turn up very promising hardrock mineral targets and sometimes even actual mineral discoveries.²⁸ Unless, as was the case with the mineral discoveries made under the Atomic Energy Commission's uranium exploration program in the 1950's,²⁹ a special law is passed authorizing competitive disposi-

²⁵See ch. 2, sec. E.

²⁶See ch. 2, subsec. D(2).

²⁷See ch. 3, sec. B.

²⁸Lacy, "Technical Developments That Should Be Considered In Drafting Mining Legislation," in University of Arizona, College of Mines, *Symposium on American Mineral Law Relating to Public Land Use 159* (J.C. Dotson ed. 1966); cf. subsec. A(2).

²⁹See, e.g., *Oversight on Access to Minerals on Public Lands*,

hearings on H.R. 8435 Before the Subcomm. on Mines and Mining of the House Comm. on Int. & Ins. Affairs, Ser. No. 94-41, 94th Cong., 1st sess. 6 (1975); Kaiser, "Assault on the Wilson Mountains," 10 *Colorado*, No. 1, at 3c, 6c (1974).

²⁹See National Academy of Sciences, *Mineral Resources and the Environment, Supplementary Report: Reserves and Resources of Uranium in the United States 192-202* (1975).

tion of such known hardrock mineral areas, '() the responsible Federal agencies face the choice of withdrawing them from location under the Mining Law or being charged with favoritism and giving away Federal resources.)'

Yet, as experience under the mineral leasing laws has demonstrated, the attempt to distinguish between known and unknown mineral areas, like any attempt at drawing a line, involves problems of definition and application. Should "known mineral areas" be defined narrowly, to include only actually discovered deposits capable of being presently extracted, processed, and marketed at a profit; or more broadly, to include any deposit the geology of which is known even if the deposit cannot currently be marketed at a profit; or more broadly still, to include deposits not actually discovered but reasonably believed to exist in view of surrounding geology; or most broadly of all, to include any area where there is substantial competitive interest? How reliably and predictably can each of these definitions, or other possible definitions, be applied?

As with almost every other aspect of the mineral leasing laws, the distinction between known and unknown mineral areas has been defined differently for different minerals, creating unnecessary complexity and confusion for the mineral industry and within the responsible Federal agencies. For example, the test for sodium, sulfur, and potassium is whether the land is "known to contain valuable deposits" of the respective mineral,³² while the test for phosphate is whether "prospecting or exploratory work is necessary to determine the existence or workability of phosphate deposits in any unclaimed, undeveloped area."³³ The phosphate language was copied in 1960 from the original 1920 test for coal, which arguably was meant to require competitive leasing in a broader set of situations than the test for sodium, sulfur, and potassium. Congress had been extremely reluctant to authorize noncompetitive prospecting permits for coal, because it believed that the existence of coal on extensive areas of Federal land was known, and that prospecting permits were therefore unnecessary." However, at the last minute, coal prospecting permits were authorized "to encourage the prospecting of undiscovered coal deposits."³⁵ Thus, Congress apparently wanted land to be competitively leased for coal development whenever it was known to contain coal that was technically workable, even if insufficient information was available to demonstrate that the coal could be profitably worked (extracted), transported, and marketed. In contrast, land containing sodium, sulfur, and potassium had to be competitively leased only when sufficient information existed to demonstrate a profitable (valuable) deposit.

Over the years the Department of the Interior has tended to merge and equate the "known to contain valuable deposits" and "existence or workability" tests, requiring competitive leasing whenever a deposit is known (through actual physical discovery or geologic inference) to exist in workable quantity, even if additional exploration is needed to project a program for development or to demonstrate profitability.³⁶ It re-

³²See, for the Atomic Energy Commission uranium discoveries, 12 U.S.C. § 2097 (1976); H.R. Rep. No. 2181, 83d Cong., 2d sess. 18 (1954).

³³Howard E. Banta, Assistant Director for Minerals and Geology, U.S. Forest Service, remarks made at the Office of Technology Assessment Workshop on Legislative Strategies for Mineral Accessibility on Onshore Federal Land, Washington, D.C., July 29, 1976.

³⁴30 U.S.C. §§ 262, 273, 283 (1976).

³⁵Ibid., § 211.

³⁶E.g., 51 Cong. Rec. 16575-16576 (daily ed. Sept. 15, 1914) [remarks of Representatives Mondell, Borland, and Ferris]; S. Rep. No. 116, 65th Cong., 1st sess. 5 (1917); 56 Cong. Rec. 7600-7601 (daily ed. May 24, 1918) [remarks of Representatives Mondell and Ferris]; 58 Cong. Rec. 4876 (daily ed. Aug. 30, 1919) [remarks of Senators Smoot and Nugent].

³⁷H.R. Rep. No. 398, 66th Cong., 1st sess. 13-14 (1919) (emphasis added).

³⁸PLLRC *Nonfuel Legal Study*, note 8, at 827-834.

mains to be seen whether the merger of these tests can survive the recent emphasis on “present marketability at a profit” as the definition of what constitutes a “valuable mineral deposit” under the mining and mineral leasing laws.³⁷

The “existence or workability” test has been applied by regulation to hardrock minerals leased on acquired land or in certain public domain areas.³⁸ It was replaced for coal in 1976 by a requirement that all coal on Federal land be leased competitively. ” Apparently, native asphalt is also available only through competitive leasing. It is not clear from the regulations whether bitumen and bituminous rock are subject to the “existence or workability” test or are available only through competitive leasing.³⁹ There are no general regulations applicable to the disposal of oil shale, but the prototype experimental leases issued in 1973 were leased competitively,” and it is likely that future leases will also be issued competitively, because the location and extent of the oil shale deposits are generally known, as with coal.

The test for known oil or gas areas is purely geologic. Competitive bidding is required for lands “within any known geological structure of a producing oil or gas field,⁴²

The broadest test of all is that for geothermal steam and associated resources. The Geothermal Steam Act of 1970 requires competitive leasing of all lands within any “known geothermal resources area, ” which is defined to include potentially every tract of land that anyone might be interested in exploring:

Known geothermal resources area” means an area in which the geology, nearby discoveries, competitive interests, or other indicia would, in the opinion of the Secretary, engender a belief in men who are experienced in the subject matter that the prospects for extraction of geothermal steam or associated geothermal resources are good enough to warrant expenditures of money for that purpose.⁴¹

The regulations of the Department of the Interior define a known geothermal resources area as land known through direct discovery or geologic inference to contain geothermal resources, land within 5 miles of a well capable of producing geothermal resources in commercial quantities unless the land is determined to be on a different geologic structure, land within the structural area contributing geothermal resources to such a producible well (regardless of distance from the well), or land covered by a lease application if at least half of such land has also been applied for in another application filed during the same application filing period.”

The “known geothermal resources area” test obviously goes the furthest in attempting to capture the value of Government mineral land for the Government itself. The most interesting part of the test is the overlapping-applications criterion. The existence of overlapping applications is an objective and easily discernible indication of competitive interest that can be used to prevent mineral-potential value from being siphoned off and burdened by speculators. Whoever can most efficiently explore and

³⁷See subsecs. D(2)(a) and D(3)(b); cf. Harris, “The Law of Mill-sites: History and Application,” 9 *Nat. Res. L.* 103, 115-116, 135-136 (1976).

³⁸43 CFR § 3501.2-7, subpts. 3510, 3520, and 3565 (1977).

³⁹30 U.S.C. § 201 (1976), as amended by Federal Coal Leasing Amendments Act of 1975, §§ 2-4, 90 Stat. 1083-1086 (1976).

⁴⁰See 43 CFR §§ 3500.0-3(a)(6), 3500.1-1, 3501.1-4(b)(6), 3521.2-2 (1977).

⁴¹38 F.R. 33188 (1973).

⁴²30 U.S.C. § 226 (1976).

⁴³*Ibid.*, § 1001(e).

⁴⁴43 CFR § 3200.0-5 (k) (1977).

develop a tract can obtain it directly from the Government through competitive bidding, rather than purchasing it from a lottery winner (as occurs now for noncompetitive oil and gas leases)⁴⁵ or the fastest claimstaker (as occurs now under the Mining Law), who usually will have done little or nothing to develop the property, but will burden its future development by retaining an overriding royalty.⁴⁶ The other portions of the test are similar to the geologic and economic criteria used for the other leasable minerals.

Overall, the “known mineral area” provisions demonstrate no uniform approach, although the basic purpose of each presumably is to obtain maximum return to the Government for its minerals and to reduce speculation. Moreover, the provisions create considerable costs and uncertainties. The geologic and economic criteria are fairly subjective, and are often difficult to apply reliably and predictably. A noncompetitive application can be rejected on the basis of information known to the Department of the Interior but not yet published in the tract books or geologic maps,⁴⁷ or even on the basis of information received after the application was filed, even though there may be considerable delay in processing an application.⁴⁸ The applicant may have expended substantial sums on regional reconnaissance and exploration prior to filing his application for a particular target.⁴⁹ The Government must expend substantial time and effort classifying land and determining acceptable bids for known mineral areas (otherwise, known subeconomic deposits, such as oil shale, may be prematurely leased to speculators, as apparently happened with coal in the 1960’s). Reliance on pure bonus bidding will favor large firms at the expense of smaller firms and individuals, but this effect can be mitigated or eliminated by using walkaway bonuses, royalties, or profit shares, instead of fixed bonuses, as the bidding variable.⁵⁰

The substantial costs and uncertainties flowing from the distinction between known and unknown mineral areas would seem to justify serious investigation of an alternative approach to maximum revenue generation and avoidance of speculation. One possibility might be a substantial predetermined Government profit share⁵¹ combined with strong diligence requirements and restrictions on overriding royalties on all mineral leases, with competitive bidding used only in cases of overlapping applications for the same tract filed within, for example, 10 days of each other. There might then be no need to define or evaluate known mineral areas.

3. Acreage Limitations

There are two basic types of acreage limitations. One limits the acreage that can be included within a single claim, permit, lease, mining unit, or other form of exclusive mineral right. The other limits the total amount of acreage that can be held by one person or corporation in the Nation, in any one State, or in some other geographic area. The principal purposes of both are to deter speculation and monopolization and to promote diligence and competition.

⁴⁵See 43 CFR subpt. 3112 (1977).

⁴⁶See subsec. F(3).

⁴⁷E.g., 43 CFR § 3100.7-3 (1977).

⁴⁸E.g., *ibid.*, § 3110.1-8.

⁴⁹See ch. 2, subsec. D(2).

⁵⁰See subsec. E(2).

⁵¹*Ibid.*

The limitation on the size of an individual claim, permit, lease, mining unit, or other tenure unit serves these purposes in two ways. First, requirements related to discovery and diligent development of mineral deposits generally apply to each tenure unit, so that a limitation on the size of the tenure unit prevents large amounts of acreage from being held by simply performing work on a much smaller number of acres. Second, the limitation on the size of the tenure unit gives smaller firms a better opportunity to participate in the development of known mineral areas, because it prevents putting up tracts for competitive bidding that are so extensive only a large company could afford to bid on or develop them.

On the other hand, if the limitation on individual tenure units is too small, it can cause unnecessary and wasteful work under the mineral discovery and diligence requirements and can prevent assembly of economic mining units for competitive bidding. The problem of unnecessary and wasteful work is acute under the Mining Law, as mining claims are generally limited to 20 acres each,⁵² while mineral firms usually need several thousand acres for a single mineral project.⁵³ A similar problem, although less acute, exists under the mineral leasing laws, which limit the size of individual permits and leases to 640 acres for sulfur permits or leases or competitive oil and gas leases: 2,560 acres for geothermal steam, hardrock, phosphate, potash, or sodium permits or leases or noncompetitive oil and gas leases: and 5,120 acres for oil shale, native asphalt, or tar sand leases.⁵⁴ Often several leases must be combined to form an economic mining unit.⁵⁵ There is no limit on the size of a coal lease, but leases cannot be combined into a logical mining unit larger than 25,000 acres.⁵⁶

All the limitations on the size of individual tenure units were considered at the time of their adoption to be sufficient to encompass economic mining units. However, the increasing scale of mining has made them too restrictive, especially the oldest limitation—the 20-acre-per-claim limitation under the Mining Law. Even the most generous limitation, the 25,000-acre limitation on logical mining units for coal, is considered by some to be insufficient for mining units formed to assemble the massive coal reserves needed for huge mine-mouth power generation plants and coal gasification and liquefaction facilities.

The advantages of a limitation on the size of individual tenure units derive from its use as a foundation for diligence requirements and selection of tracts for competitive bidding, rather than from the limitation itself (as multiple contiguous tenure units generally are allowed). Thus, a more flexible and effective approach might be to replace the acreage limitation on individual tenure units with 1) a limitation, established perhaps by the Secretary of the Interior, on the contiguous acreage that can be treated as a unit for the purpose of satisfying mineral discovery and diligence requirements, subject to enlargement in particular cases upon a satisfactory showing to the Secretary, and 2) a requirement that tracts put up for competitive bidding be no larger than necessary, in the judgment of the Secretary of the Interior, for an economic mining unit.

⁵²See subsec. C(2).

⁵³See the acreage figures cited for stages 3 through 6 of mineral activity in ch. 2, table 2.6 and subsecs. D(3) and D(4), and app. C, tables C.2 through C.5.

⁵⁴See subsecs. C(3)(a) and D(3)(a).

⁵⁵See the sources cited in note 53. See also U.S. General Accounting Office, *Acreage Limitations on Mineral Leases Not Effective*, RED-76-117, June 24, 1976, at 12-13 (hereinafter cited as *GAO Acreage Limitations Study*).

⁵⁶See subsec. D(3)(a).

Although there would be no need for maximum acreage limitations on individual tenure units under such an approach, a fairly large minimum acreage limitation on initial acquisition and subsequent assignment of tenure units would avoid the administrative costs, anticonservation effects (due to retention of overriding royalties on assignment),⁵⁷ and tract-assembly problems caused by speculation in small parcels of mineral land, which now occurs with respect to oil and gas leasing⁵⁸ and acquisition of claims under the Mining Law.⁵⁹ Currently, minimum parcel sizes are specified only for assignments of oil or gas leases (40 acres, which is too small) or geothermal steam leases (640 acres).⁶⁰

There is no nationwide, statewide, or other limitation on the total acreage or number of claims that can be held by any one person or firm under the Mining Law. Although originally a prospector was not allowed to locate more than one mining claim on any one lode (mineral deposit),⁶¹ individuals and firms may now locate as many mining claims as they wish.

There are limitations on the total amount of acreage that any individual or corporation can hold under the mineral leasing laws. There is no apparent rationale, however, for the different limitations specified for each leasable mineral: for coal, 46,080 acres per State, but no more than 100,000 acres nationwide; for geothermal steam, 20,480 acres per State (which the Secretary of the Interior can raise after December 24, 1985 to 51,200 acres); for hardrock minerals on acquired land, 20,480 acres (nationwide?), of which no more than 10,240 acres can be held under lease (rather than permit) unless otherwise authorized by the Secretary to promote orderly development of mineral resources (no authorization will be given if it would result in undue control of the mineral to be mined or in the leasing of more than 10,240 acres for mining any dominant single mineral); for native asphalt or the tar sands, 7,680 acres per State; for oil shale, no more than one lease nationwide; for oil and gas, 246,080 acres per State in States other than Alaska, and 300,000 acres in each of the two leasing districts in Alaska; for phosphate, 20,480 acres nationwide; for potassium, 25,600 acres per State in leases and 51,200 acres per State in permits; for sodium, 5,120 acres per State (which the Secretary can raise to 15,360 acres to ensure economic mining in a specific situation); and for sulfur, no more than three permits or leases per State.⁶²

These acreage limitations on total holdings, except for the limitations on holdings of hardrock minerals and geothermal steam, are those specified for permits and leases on the public domain under the Mineral Leasing Act of 1920. The Mineral Leasing Act for Acquired Lands of 1947 authorizes the leasing of minerals on acquired land "under the same conditions as contained in the (Mineral Leasing Act of 1920)." ⁶³The Secretary of the Interior has interpreted this language as creating limitations on acquired landholdings separate from but identical to those specified for public domain holdings, thus doubling the total permissible Federal landholdings.⁶⁴

⁵⁷See subsec. F(3).

⁵⁸GAO *Acreage Limitations Study*, note 55, at 13-14.

⁵⁹See subsec. C(2)(a) and ch. 2, sec. F.

⁶⁰43 CFR § 3241.1-1 (1977). An exception can be made in the interest of conservation of the resources.

⁶¹PLLRC *Nonfuel Legal Study*, note 8, at 34, 49.

⁶²43 CFR § 3501.1-4(b)(2) (1977) (potassium); *ibid.*, § 3501.2-

5(b)(2) (hardrock); 30 U.S.C. § 275 (1976) (sulfur); *ibid.*, § 1006 (geothermal steam); *ibid.*, § 241(a) (oil shale, native asphalt, and tar sands); *ibid.*, § 184 (all other minerals).

⁶³30 U.S.C. § 352 (1976). See ch. 3, subsec. D(3) for the distinction between public domain and acquired land.

⁶⁴43 CFR § 3501.2-5(a) (1977).

The primary purposes of acreage limitations on total holdings, as was stated previously, are to deter speculation and monopolization and to promote diligent development and competition. The limitations were initially imposed at a time when antitrust laws were weak or nonexistent. There is some question whether the limitations are still necessary or useful to prevent monopoly, given the antitrust laws now in effect. Limitations that are too low will constrain the activities of the more efficient and hence more successful firms, even when there is no monopoly problem. This unnecessarily raises the costs of supplying minerals to the consuming public. Moreover, the current limitations are much too high to deter speculation, especially by the smaller firms and most likely even by the larger firms. The limitations in the mineral leasing laws as originally enacted allowed holding of only one or a few leases per State, but except for sulfur and oil shale those original limits have been raised tremendously by Congress at the urging of the affected mineral producers.” The generosity of the current limitations also erodes their effectiveness in assuring diligent development, which can be approached much more effectively through short lease periods, stiff holding charges, or substantial work requirements.⁶⁶

On the other hand, limitations on total holdings can provide some breathing room for the smaller or less efficient firms, and may thereby serve traditional small business promotion goals. Whether they are actually necessary to provide such breathing room is an open question.⁶⁷ Moreover, the difficulties of enforcing the limitations (even though much of the difficulty is attributable to the archaic recordkeeping practices of the responsible Federal agencies)” suggest that more direct approaches to subsidizing small miners on Federal and non-Federal land may be preferable to the Federal acreage limitations.

C. Acquiring and Maintaining Tenure for Exploration

1. Defining Exploration Tenure

“Tenure” refers to the right to make use of land for certain purposes for a definite or indefinite period of time. In the mineral context, tenure involves an exclusive right of use. An exclusive right of use for exploration purposes is necessary or desirable generally when, as a result of regional appraisal and reconnaissance, interest has focused on a specific target that can be further investigated only through detailed surface investigation and three-dimensional physical sampling (stages 3 and 4 of the 6 stages of mineral activity described in chapter 2), Exploration continues until an actual physical discovery has been made of economic grade mineralization in sufficient quantity to support a commercial mining operation. At that point, exploration ceases and development begins.⁶⁹

In this section, exploration tenure is discussed by itself. Development and production tenure will be discussed in the next section. Although exploration tenure is worth-

⁶⁶GAO Acreage Limitations Study, note 55, at 5-6, 26-27; PLLRC Nonfuel Legal Study, note 8, at 749-750.

⁶⁷See sec. C and D.

⁶⁸GAO Acreage Limitations Study, note 55, at 4-12

⁶⁹Ibid., at 18-23.

⁷⁰See ch. 2, subsecs. C(1), C(2), D(2), and D(3).

less in the absence of development and production tenure, or some sufficient substitute reward for successful exploration, there are good reasons for treating them separately. First, the mineral laws themselves generally distinguish between these two tenures. Second, exploration is fundamentally different from development and production, not only in terms of techniques, activities, and land requirements,⁷⁰ but also in terms of its inherently greater uncertainty and usually larger risks.⁷¹ This difference is reflected in the separation of exploration activities from development and production activities within most mineral companies, and within the mineral industry as a whole.

2. Exploration Tenure Under the Mining Law

a. Acquiring Exploration Tenure: Pedis Possessio and Claim Location

A mineral explorer under the Mining Law cannot obtain any tenure rights against the United States. He can obtain only limited possessor rights under the pedis possessio doctrine against other mineral explorers.

Tenure rights against the United States under the Mining Law can be obtained only upon discovery of a valuable mineral deposit and location (staking) of a claim encompassing the discovery⁷²—that is, only after exploration has been successfully completed. Until such a discovery and location have been made (which under the current interpretation of “valuable mineral deposit” may not be until well into the development stage⁷³) the mineral explorer is merely a tenant at the will of the Secretary of the Interior, who can at any time withdraw the land being explored from availability under the Mining Law.

Under the literal language of the Mining Law, there is no tenure even against other explorers prior to discovery of a valuable mineral deposit: “no location of a mining claim shall be made until the discovery of the vein or lode within the limits of the claim located.”⁷⁴ However, early in the history of the Mining Law, it became apparent that some sort of prediscovery protection was needed for exploration that required substantial sampling or excavation. Thus the courts created the pedis possessio doctrine, which permits location of a claim prior to discovery and provides limited protection against encroachment on the claim by other prospectors. The requirements and limitations of the doctrine will be discussed in subsection 2(b) immediately below.

Such exploration tenure as exists under the Mining Law can be obtained only through the expenditure of considerable time or money, or both, on unproductive claim location activities. Each claim location must be “distinctly marked on the ground so that its boundaries can be readily traced” and must be maintained each year by the performance of at least \$100 worth of labor or the making of at least \$100 worth of improvements. The State in which the claim is located can specify additional requirements “governing the location, manner of recording, and amount of work necessary to hold possession” of a claim, ”

⁷⁰See ch. 2, sec. D.

⁷¹See ch. 2, sec. E.

⁷²30 U.S.C. §§ 22, 23, 35 (1976).

⁷³See ch. 5, subsec. D(5).

⁷⁴30 U.S.C. § 23 (1976).

⁷⁵30 U.S.C. § 28 (1976).

As a consequence of the piecemeal development of the Mining Law between 1860 and 1872, a distinction was created between two types of mineral deposits, and separate location procedures were provided for each type. A lode claim must be located for any vein or lode of rock in place that bears a valuable deposit. The location must be made along the strike (length) of the mineral vein, up to a maximum length of 1,500 feet and a maximum width of 300 feet on each side of the vein. A placer claim must be located for any other type of deposit. The location must “conform as near as practicable” to the rectangular public land surveys and cannot exceed 20 acres for each individual claimant, or 160 acres for an association of eight individuals. Failure to locate a deposit properly as a lode or a placer will invalidate the attempted location. ”

The most significant legal aspect of the distinction between a lode claim and a placer claim is that a valid lode claim, but not a placer claim, carries with it certain extralateral rights to any vein the apex of which lies within the boundaries of the claim: the dip of the vein may be followed and mined beyond the sidelines of the claim. ”

From the beginning, the distinction between lode and placer claims has been difficult to apply. It has resulted in confusion, litigation, and frustration of miners’ expectations. The extralateral rights associated with lode claims have caused even more confusion, litigation, and frustration. The distinction is particularly inappropriate today, when many exploration targets are large disseminated deposits, encompassing hundreds or thousands of acres, which are held in place by rock but have no distinct strike or apex. Such targets are located through multiple contiguous claims oriented to cover the target efficiently, and any possible extralateral rights beyond the blanket of claims are usually waived by agreements between locators of adjacent targets.⁷⁹

Nevertheless, the lode/placer distinction remains in the Mining Law, so that prudent locators must cover a target with duplicate lode and placer claims to eliminate the risk of choosing the wrong type of claim for the deposit. Moreover, the duplicate claims must be filed in the proper sequence to avoid having the placer claim construed as an abandonment of the lode claim.⁸⁰

The requirements for locating claims vary from State to State (thus introducing additional needless inconsistency into the Mining Law), but they generally include detailed instructions for marking a claim with physical monuments, sinking a shaft or drilling a hole to a certain depth to show good faith, and posting and recording notices.⁸¹ “The cost of doing all this, most of which is nonproductive and unnecessary,” has been estimated to range from \$25 to more than \$500 per claim, depending on the terrain and locale.⁸³

The costs involved in acquiring exploration tenure under the Mining Law are not limited to the direct costs of locating the 50 or more claims required to cover a typical single exploration target. (The maximum size of either a lode or placer claim is around

⁷⁹See ch. 3, subsecs. B(2) and B(3).

⁸⁰30 U.S.C. §§ 23, 35, 36 (1970); *PLLRC Nonfuel Legal Study*, note 8, at 305-318. For a recent congressional attempt to deal with the effects of the lode/placer distinction in the narrow context of the switch from location to leasing of deposits of asphalt and tar sands, see 30 U.S.C. § 241(b) (1976).

⁸¹30 U.S.C. § 26 (1976).

⁸²*PLLRC Nonfuel Legal Study*, note 8, at 555-577, 1092-1093, 1096, III-44, II-47.

⁸³Harris, note 37, at 118-120.

⁸⁴*PLLRC Nonfuel Legal Study*, note 8, at 457-548.

⁸⁵See ch. 5, subsec. D(2)(a).

⁸⁶Peters, “Acquire First, Explore Last,” *Mining Eng.*, November 1974, at 78; MacDonnell, *Public Policy for Hard-Rock Minerals: Access on Federal Lands: A Legal-Economic Analysis*, 71 *Q. Colo. Sch. Mines*, No. 2, at 39 (1976); Northwest Mining Association, *Mineral Industry Costs* 22, 55 (1977).

20 acres, except for association placer claims, which can be as large as 160 acres for an association of eight or more individuals,) There are also the costs of finding, buying, leasing, or contesting conflicting claims located by other parties. Such claims have at least a nuisance value, since a mining claim, once located, continues indefinitely and can be given the appearance of validity by a show of minimum work or alleged discovery.

b. Maintaining Exploration Tenure: *Pedis Possessio* and Assessment Work

The *pedis possessio* doctrine is subject to restrictions that severely limit the pre-discovery protection it affords. A claimholder is protected under the doctrine only as long as he is in actual continuous occupancy of the claim and is diligently and persistently prosecuting work looking to discovery of a valuable mineral deposit in the claim. Even then, he is protected only against “forcible, fraudulent or clandestine intrusion” by another: the doctrine does not protect against an unresisted, peaceable and open entry by another explorer.⁸⁴ Nor does it protect against “forcible, fraudulent or clandestine” intrusion upon one who is not in actual occupancy or who is not diligently working toward a discovery. In fact, it is not entirely clear whether the entire claim is protected or only that portion of the claim actually being occupied and worked, or whether the protection expires after a certain (reasonable) amount of time.⁸⁵

The limitations of the *pedis possessio* doctrine result in weak pre-discovery protection even for a single claim. When the doctrine is applied to multiple contiguous claims located to cover today’s typically large exploration target, it provides practically no protection at all. Only those claims actually being occupied and worked are protected, even though an efficient exploration plan might call for sequential drilling on only one or a few of the many claims covering the target. The explorer faces the undesirable choice of simultaneously performing work that anticipates discovery on each and every claim, hiring armed guards to protect his claims (illegally) against entry by others,⁸⁶ or having some or most of his claims “jumped” by other prospectors.⁸⁷

The obvious inadequacy of the *pedis possessio* doctrine has led to the development of unwritten customs or “gentlemen’s agreements” in active exploration areas whereby prospectors will ordinarily not intrude on a block of claims even though work is being actively prosecuted on only some of them.⁸⁸ But these customs are neither universally applied nor uniformly followed, and they create no legal rights.⁸⁹ Moreover, like the *pedis possessio* doctrine itself, they afford no protection against termination of the claim by the Federal Government.

Tenure must be maintained under the Mining Law by at least \$100 worth of labor or improvements for each claim each year. This “assessment work” requirement will be discussed more fully in the next section on development and production tenure. It is sufficient to note here that satisfaction of the assessment work requirement will usually not be enough to maintain exploration tenure, which, as was noted above, also depends on satisfaction of the much stricter *pedis possessio* requirements of *continued*

⁸⁴Cole v. Ralph, 252 U.S. 286, 294 (1920).

⁸⁵PLLRC Nonfuel Legal Study, note 8, at 348-360.

⁸⁶As happened recently in Utah. *Ranchers Exploration and Development Co. v. Anaconda Co.*, 248 F. Supp. 708 (D. Utah 1965).

⁸⁷See *Adams v. Benedict*, 327 P.2d 308 (N.M. 1958).

⁸⁸PLLRC Nonfuel Legal Study, note 8, at 362.

⁸⁹See, e.g., *Lombardo Turquoise Milling and Mining Co. v. Hermanes*, 430 F. Supp. 429, 443-444 (D. Nev. 1977), and the two cases cited in notes 86 and 87. But compare *MacGuire v. Sturgis*, 347 F. Supp. 580 (D. Wyo. 1971); *Columbia Standard Corp v. Ranchers Exploration & Development, Inc.*, 468 F.2d 547 (10th Cir. 1972).

actual occupancy and persistent and diligent working of each claim. Assessment work alone will maintain tenure only on a claim on which there has been an actual discovery of a valuable mineral deposit—i.e., a claim that has passed from the exploration to the development stage.⁹⁰

3. Exploration Tenure Under the Mineral Leasing Laws

a. Acquiring Exploration Tenure

Exploration tenure under the mineral leasing laws is acquired by obtaining a prospecting permit or a lease, depending on the mineral. Initial issuance of all prospecting permits and leases is at the discretion of the Secretary of the Interior” (except for uranium permits and leases issued at the discretion of the Secretary of Energy for certain land either not subject to or withdrawn from the operation of the Mining Law),^{91*}

Prospecting permits and leases may be issued for acquired land, for land withdrawn or reserved for military purposes, or for coal or geothermal steam only with the consent of the surface management agency.⁹¹{

Exploration tenure for the nonfuel leasable minerals (sodium, sulfur,*) phosphate, potassium, and, on most national forest acquired land and certain public domain areas, the hardrock minerals) is provided by a separate prospecting permit for each mineral, except that a single permit may be issued to cover all the hardrock minerals.⁹⁵ A prospecting permit grants an exclusive right to explore the permit area for the mineral specified in the permit but does not authorize mining operations.(”) Successful exploration under the permit may entitle the permittee to issuance of a preference-right development and production lease,{) ’

Exploration tenure for oil and gas or geothermal steam is provided by a separate noncompetitive lease for either oil and gas⁹⁸ or for geothermal steam.”” A noncompetitive lease grants an exclusive right to explore for, develop, and produce the minerals specified in the lease,

Prospecting permits and noncompetitive leases are issued to the first applicant,¹⁰⁰ who must submit a \$10 filing fee (\$50 for a noncompetitive geothermal steam lease) and the first year’s rental (\$0.25 per acre, but no less than \$20 total, for permits; \$1 per acre for a noncompetitive lease) with each application for a permit or lease.¹⁰¹ All permits and leases must be taken in reasonably compact form according to the legal subdivisions of the public land surveys or, if not surveyed, by a special survey. The

**PLLRBC Nonfuel Legal Study*, note 8, at 351-352, 357.

”See subsec. B(1).

⁹²42 U.S.C. § 2097 (1976); H.R. Rep. No. 2181, 83d Cong., 2d sess. 18 (1954).

⁹³E.g., 30 U.S.C. §§ 201(a)(3)(A)(iii) (coal), 352 (acquired land) & 1014(b) (geothermal steam) (1976); 43 U.S.C. § 158 (military land) (1976).

⁹⁴Sulfur is locatable on the public domain in States other than New Mexico and Louisiana. See note 13.

⁹⁵30 U.S.C. §§ 211 (phosphate), 261 (sodium), 271 (sulfur), 281 (potassium) (1976); see 43 CFR §§ 3500.0-3(b)(2), 3501.2-5(b)(2),

3511.2-1(b)(2) (1977) (hardrock minerals).

⁹⁶43 CFR §§ 3510.1-2, 3521.4-1 (1977).

⁹⁷See subsec. D(3)(b).

⁹⁸30 U.S.C. § 226 (1976).

⁹⁹*Ibid.*, § 1003.

¹⁰⁰Drawings are used to determine priority when two or more applications have been filed simultaneously. E.g., 43 CFR §§ 1821.2-3, 3000.6-1, 3112, 3511.1-6 (1977).

¹⁰¹43 CFR §§ 3503.2-1, 3503.3-1(a) (1977) (permits); *ibid.*, §§ 3205.2(b), 3205.3-1 (1977) (geothermal steam); *ibid.*, §§ 3103.2-1(a), 3103.3-1, 3103.3-2(a) (1977) (oil or gas).

maximum size of each permit or lease is 2,560 acres, except for sulfur (640 acres).” Permits and leases are noted on the official land tract books and maps,

Prospecting permits and noncompetitive leases cannot be issued for known mineral areas, which must be competitively leased. Moreover, since the location and extent of Federal coal, oil shale, and native asphalt deposits are generally known, all such deposits are essentially treated as known mineral areas and are competitively leased (the status of bitumen and bituminous rock is not clear).¹⁰³ Some predevelopment tract evaluation exploration may occur under competitive leases for any of the minerals, but the riskier deposit-location type of exploration generally will occur only under prospecting permits or noncompetitive leases.¹⁰⁴ Thus, discussion of competitive leases will be postponed until subsection D(3)(a).

b. Maintaining Exploration Tenure

Exploration tenure under prospecting permits is limited to a primary period of 2 years, but potassium permits and hardrock permits may be extended for up to 2 additional years and phosphate permits may be extended for up to 4 additional years, if the Secretary of the Interior believes an extension is warranted. Sodium permits and sulfur permits cannot be extended beyond their 2-year primary period.¹⁰⁵

The short periods of prospecting permits provide a strong incentive for diligent exploration, because no development or production rights can be obtained for the land covered by a permit unless a valuable deposit of the mineral specified in the permit is discovered in the land during the period of the permit.¹⁰⁶

Other diligence-related provisions applicable to prospecting permits are relatively insignificant. The regulations require payment of an annual rental of \$0.25 per acre, but not less than \$20 total, for each permit. Failure to pay the rental when due will result in automatic termination of the permit.¹⁰⁸ The rental is nominal, amounting to only \$640 for the maximum permit size (for most minerals) of 2,560 acres. The rental provisions do, however, provide an efficient means of clearing abandoned permits, and they may provide some deterrent against speculation (although the short permit periods would seem to be more effective deterrents in most situations).

Similarly, although any permit may be cancelled “upon failure by the permittee to exercise due diligence in the prosecution of the prospecting work in accordance with the terms and conditions stated in the permit,”¹⁰⁹ the shortness of the permit periods and the lack of any specific requirements or guidelines regarding “due diligence”¹¹⁰ combine to make the cancellation authority useful only when essentially no work has been performed during the first year or two of a 4-year extension of a phosphate prospecting permit.

¹⁰³43 CFR §§ 3101.1-1, 3203.2, 3501.1-4(b) (1977).

¹⁰⁴See subsec. B(2).

¹⁰⁵The prominent exception is exploration under geothermal steam leases issued competitively only because of overlapping applications or proximity to nearby discoveries. *Ibid.*

¹⁰⁶30 U.S.C. §§ 211(c), 287 (1976); 43 CFR §§ 3511.1, 3511.3 (1977).

¹⁰⁷See subsec. D(3)(b).

¹⁰⁸43 CFR § 3503.3-1(a) (1977), upheld in *Hannifer v. Morton*, 444 F.2d 200 (5th Cir. 1971).

¹⁰⁹43 CFR § 3511.4-2(b) (1977).

¹¹⁰30 U.S.C. § 183 (1976); 43 CFR § 3511.4-3 (1977).

¹¹¹The standard permit form merely requires the permittee “to diligently prospect the lands by core drilling or other acceptable methods.” BLM Permit Form 3510-1, Permit Conditions § 1 (1977) (emphasis added).

The duration of and requirements for maintaining noncompetitive oil and gas or geothermal leases are considerably more complicated than the prospecting permit provisions. Much of the complication relates to the development and production stages and is left for discussion in subsection D(3)(c). The discussion here will focus on the aspects most relevant to the exploration phase.

Both noncompetitive oil and gas leases and noncompetitive geothermal leases are issued for a primary period of 10 years, which is extended for an additional 2 years for oil and gas leases or an additional 5 years for geothermal leases if actual drilling operations were commenced on the land under lease prior to the end of the primary period and are being diligently prosecuted at that time. Any further extension of the lease may be had only if oil, gas, or geothermal steam, as the case may be, is being produced in commercial quantities, or if a well has been completed that is capable of producing in commercial quantities.”

These periods for noncompetitive leases, unlike those for prospecting permits, provide little or no incentive for diligent exploration, since they allow leases to be held for 10 years without any drilling, grant an additional 2 or 5 years if drilling operations are underway at the end of the 10 years (the operations can be abandoned as soon as the extension has been obtained), and thus allow 12 or 15 years to pass before there is any need to complete a well capable of producing.

These provisions are in marked contrast to the prospecting permit provisions that originally governed oil and gas exploration under the Mineral Leasing Act of 1920, and that produced a glut of oil in the 1930's. The oil and gas prospecting permit, replaced by noncompetitive leases in 1935, was limited to a primary period of 2 years, was conditioned on commencement of drilling operations during the first 6 months and drilling of one or more wells to a depth of at least 500 feet each during the first year and to an aggregate depth of at least 2,000 feet by the end of the second year (unless valuable deposits of oil or gas were discovered at less depth), and allowed extension of the permit for an additional 2 years if the Secretary of the Interior found that the permit tee had been unable, with the exercise of diligence, to test the land.¹¹²

Minimum annual rentals of \$0.50 per acre for oil and gas leases and \$1 per acre for geothermal leases are required by law.¹¹³ In 1977, the Secretary of the Interior raised the annual rental for noncompetitive oil and gas leases issued on or after February 1, 1977 to \$1 per acre.¹¹⁴ If the known geologic structure of a producing oilfield or gasfield should be defined to include any part of a noncompetitive oil or gas lease, the annual rental for the entire lease will be raised to \$2 per acre.¹¹⁵ The annual rental for a geothermal lease is raised \$1 per acre each year beginning in the sixth year of the lease, but payment of all or any of the additional rental maybe waived upon a showing of sufficient justification.¹¹⁶ The rental obligation continues for oil and gas leases until there has been a discovery of oil or gas in paying quantities; it continues for geother-

¹¹² 30 U.S.C. §§ 226(e) (oil or gas), 1005 (geothermal steam) (1976).

¹¹³ Act of Feb. 25, 1920, § 13, P.L. No. 146, 66th Cong., 2d sess., ch. 85, 41 Stat. 437, 441 (1920). Many oil and gas prospecting permits were canceled in the 1930's for failure to comply with the drilling requirements. Swenson, "Of Mountains and Mice," 6

Land & Water L. Rev. 135, 141 (1970).

¹¹⁴ 30 U.S.C. §§ 226(d), 1004(c) (1976).

¹¹⁵ 42 F.R. 1033 (1977), amending 43 CFR § 3103.3-2(a) (1976).

¹¹⁶ 43 CFR § 3103.3-2(b)(1) (1977).

¹¹⁷ 43 CFR § 3205.3-3 (1977).

mal leases until commencement of production in commercial quantities, '17 Failure to pay the rental when due automatically terminates a lease unless there is a well capable of producing in commercial quantities.¹¹⁸

These rentals, especially the escalating rentals beginning in the sixth year of a geothermal lease, are much higher than those required for prospecting permits, but it is not clear that they are high enough to act as a strong incentive for diligent exploration. The \$1 per acre rental for a noncompetitive oil or gas lease amounts to a holding charge of only \$2,560 per year for the maximum 2,560-acre lease. The holding charge for a 2,560-acre geothermal lease would also be only \$2,560 for each of the first 5 years, but would reach \$15,360 for the 10th year and \$28,160 for the 15th and final year of an extended lease, unless waived. These charges are small compared with the hundreds of thousands of dollars that would have to be spent on actual detailed exploration of a lease,¹¹⁹ and they thus will have little effect on the decision whether or when to explore. Yet rentals set at a level comparable to the costs of actual exploration would greatly increase total costs during the exploration stage without any associated increase in exploration data (rentals are a nonproductive holding charge).¹²⁰

Although the noncompetitive **lease** rentals do not ensure diligent exploration, they may deter acquisition of leases for purely speculative purposes, at least by less wealthy individuals and firms. But even this is doubtful for rentals of only one or a few dollars per acre. The \$0.50 per acre rental for noncompetitive oil and gas leases issued after 1960 but prior to 1977 did not prevent rampant speculation in such leases. Oil and gas leases on onshore public land at the end of 1972 encompassed 72 million acres, but more than 90 percent of the leases were not producing, and most of these were not believed to be worth drilling.¹²¹ More than 85 million acres were encompassed by noncompetitive oil and gas leases in 1976.¹²² Speculation about a possible oil strike in eastern Nevada in late 1976 resulted in issuance of up to 100 noncompetitive leases a day for several months.¹²³ No drilling was expected on 90 percent of the leases, which were issued to individuals as well as major companies at rentals of \$1 per acre.¹²⁴

All things considered, rentals may be useful only as charges for the value of surface uses lost as a result of mineral activities (that is, as typical land-rent or opportunity-cost charges),¹²⁵ rather than as incentives for diligent exploration or development. Diligence may be more reasonably and effectively enforced through other mechanisms such as short exploration periods, specific work requirements (e. g., drilling requirements), or exploration expenditure requirements.

There are no work, expenditure, or other specific diligence requirements for exploration under noncompetitive oil and gas leases, except the requirements for extended tenure discussed above. The law requires oil and gas leases to contain provisions "for the purpose of insuring the exercise of reasonable diligence, skill, and care

¹¹⁸30 U.S.C. §§ 226(d), 1004(d) (1976).

¹¹⁹30 U.S.C. §§ 188(b), 1004(c) (1976).

¹²⁰See ch. 2, table 2.6 and subsec. D(3), and app. C, tables C.2 through C.5.

¹²¹This cost inflation effect would be avoided if actual exploration expenditures could be credited against rentals, as is permitted for exploration expenditures on geothermal leases in excess of a required minimum. See the discussion in the text at note 131.

¹²²U.S. General Accounting Office, Letter B-178205, July 12, 1974.

¹²³See U.S. Bureau of Land Management, *Public Land Statistics, 1976*, tables 77-80 (1977).

¹²⁴*Land Use Planning Reports*, Dec. 13, 1976, at 7.

¹²⁵Roger McCormack, Associate State Director for Nevada, U.S. Bureau of Land Management, oral communication, December 1976.

¹²⁶See ch. 5, subsec. E(6).

in the operation of [the] property, ”¹²⁶ but the noncompetitive lease forms merely require the lessee to “exercise reasonable diligence in drilling and producing the wells herein provided for, ” to either drill and produce all wells necessary to protect the leased land from drainage by wells on adjacent land or pay the estimated royalty lost through such drainage, and to promptly “drill and produce such other wells as the Secretary of the Interior may reasonably require in order that the leased premises may be properly and timely developed in accordance with good operating practice.”¹²⁷ The Secretary has never attempted to force diligent exploration by implementing the last quoted provision.¹²⁸

The regulations for geothermal leases, on the other hand, contain an interesting approach to fairly specific requirements for diligent exploration, under authority granted to the Secretary to prescribe rules and regulations for, among other things, “the maintenance by the lessee of an active development program.”¹²⁹ The regulations build on and essentially replace the rental requirements with exploration expenditure requirements. As was discussed above, the Geothermal Steam Act establishes a minimum annual rental of \$1 per acre, and the regulations raise the rental \$1 per acre each year beginning in the sixth year of the lease. The diligence regulations state that, also beginning in the sixth year of the lease, exploration operations each year must cost at least twice the rental required for that year in order to qualify as diligent exploration for the year, except that the required exploration expenditures shall in no event exceed twice the rental required for the 10th year.¹³⁰ Thus, escalating exploration expenditure requirements are piggybacked on the escalating rental requirements. Moreover, the regulations allow any expenditures for diligent exploration operations during the first 5 years of the lease, and any such expenditures in excess of the minimum required expenditures in the sixth and succeeding years, to be credited, in such proportions as the lessee may designate, against 1) required expenditures for future years or 2) required rentals for the current or future years in excess of the basic fixed rental established for the first 5 years of the lease.¹³¹ In essence, without affecting the basic fixed rental, which is not subject to credit and must be paid each and every year, an additional escalating rental has been created that can be satisfied by exploration expenditures in excess of the minimum required exploration expenditures. The situation creates a very strong incentive to incur such excess expenditures in an amount exactly equivalent to the additional escalating rental. The money must come out of the lessee’s pocket in any event, and he would ordinarily rather spend it on useful exploration work than on rentals.

The net effect for the sixth and each succeeding year of a geothermal lease is the retention of a small fixed statutory rental and the creation of an annual work requirement similar to the payable, bankable, escalating assessment work requirement advocated by the mineral industry for mineral activities under the Mining Law, including almost equivalent expenditure figures.¹³² Assuming that the basic rental for a geother-

¹²⁶30 U.S.C. § 187 (1976).

¹²⁷BLM Lease Forms 3110-1 (1977) (public domain) and 3110-3 (1973) (acquired land).

¹²⁸U.S. National Aeronautics and Space Administration, *Onshore Lease Management Program Study for the U.S. Geological Survey* 75 (1974).

¹²⁹30 U.S.C. § 1023 (1976).

¹³⁰43 CFR § 3203.5 (1977). The actual formula is a bit more complicated, but the statement in the text is accurate assuming the lease adopts the statutory minimum rental as the actual rental for the first 5 years.

¹³¹*Ibid.*

¹³²See subsec. D(2)(b).

mal lease is set at the statutory minimum of \$1 per acre, there will be a diligent exploration expenditure requirement of \$4 per acre plus a very strong incentive for an additional expenditure of \$1 per acre (in lieu of the \$1 additional rental) during the sixth year of the lease. This can be viewed as a work requirement of \$5 per acre with the option to pay \$1 of the \$5 to the Government rather than spending it on work. The work requirement will escalate \$3 per acre each succeeding year until a work requirement of \$17 per acre, of which \$5 can be paid to the Government rather than spent on work, is reached in the 10th year. The requirement will then escalate only \$1 per year (the amount of annual increase in the rental) until a maximum work requirement of \$22 per acre, of which \$10 can be paid to the Government rather than spent on work, is reached in the 15th year. Any exploration expenditures in the first 5 years of the lease or in excess of the work requirement for the sixth and each succeeding year can be “banked” and applied to work requirements in future years.

Unfortunately, the work requirement so laboriously constructed on top of the basic rental requirement is apparently not worth the effort in terms of its effect on diligent exploration. There is no requirement that any exploration work be performed during the first 5 years of the lease, and the expenditure required for the sixth and each succeeding year does not come close to the hundreds of dollars per acre per year spent, on the average, for actual detailed exploration. Using the figures cited in the previous paragraph, only \$140,800 would be required to be spent on exploration during the first 10 years of a geothermal lease, a sum several times less than the cost of drilling even one well.¹³³ Thus, commencement of drilling or any other substantial exploration activity prior to the end of the 10th year is more likely to result from the independent requirement that such drilling be commenced in order for a lease to be extended beyond 10 years, than from the “diligent exploration” work requirements,

D. Acquiring and Maintaining Tenure for Development and Production

1. Defining Development and Production Tenure

Development begins after an actual physical discovery has been made of economic grade mineralization in sufficient quantity to support a commercial mining operation. During the development stage, the quantity, quality, and geology of the mineral deposit are ascertained in the detail required for production planning; production wells or mine workings are developed; and mining-related facilities are constructed in preparation for production.¹³⁴

Production consists of the actual extraction of mineral or ore from the mineral deposit in commercial quantities. It usually includes some onsite milling or processing prior to shipment of the mineral elsewhere for further processing or use. Production continues as long as mineral is extracted in commercial quantities.¹³⁵

¹³³U.S. General Accounting Office, *Problems in Identifying, Developing, and Using Geothermal Resources*, RED-75-330, Mar. 6, 1975, at 41-42.

¹³⁴See ch. 2, subsecs. C(1), C(2) and D(4).

¹³⁵*Ibid.*, subsecs. C(1), C(2) and D(5).

In practice, development often continues well into the production stage of mineral activity, as additional portions of the deposit are blocked out for production, or secondary or tertiary recovery techniques are initiated. Thus, development and production are lumped together for tenure purposes under the Federal mineral laws and are discussed together in this section,

2. Development and Production Tenure Under the Mining Law

a. Acquiring Development and Production Tenure: Patents and Claims

Development and production tenure under the Mining Law is only slightly less uncertain than exploration tenure. The indispensable element for acquiring and maintaining tenure is the actual discovery and continuing existence of a “valuable mineral deposit” within the boundary of each claim. The “valuable mineral deposit” criterion has been subject to varying interpretation over the last 100 years, but it is currently read as requiring proof that the deposit could be presently mined and marketed at a profit, using available technology, and taking all costs (extraction, processing, transportation, environmental protection, marketing, etc.) and even financing arrangements into account.¹³⁶ Such a criterion creates considerable uncertainty as to tenure, since costs and mineral prices often fluctuate. Moreover, tenure cannot be assured under such a criterion for deposits that are expected to be produced in 10 or 20 years but are not now marketable.

Tenure would be even more uncertain if the “comparative value” interpretation of the criterion, which requires proof that the land is more valuable for mineral production than for nonmineral purposes,” were given renewed emphasis.

If the valuable mineral deposit criterion has been satisfied for a specific mining claim, and if at least **\$500** worth of labor has been performed or improvements made on the claim, complete fee title to the surface and the subsurface of the claim may be obtained by paying a nominal \$2.50 or **\$5.00** per acre (depending on whether the claim is for a placer or a lode, respectively) for a title document known as a “patent.”¹³⁸ A patent provides tenure as secure as title to any other piece of private property. Once a deposit has been patented, it can no longer be contested under the valuable mineral deposit criterion, unless the patent was fraudulently obtained.

However, patent proceedings can be lengthy and expensive, and there is always the danger that, given the strictness of the valuable mineral deposit criterion and the unpredictable fluctuation of costs and mineral prices, a patent will be denied and the claim will be invalidated. Many claimholders prefer not to assume the expense and risk of a patent application, since the deposit can be developed and mined without obtaining a patent, in which case the burden will be on the Government to bring a contest proceeding to prove lack of a valuable discovery. On the other hand, if a patent is not obtained, there is always the risk of having the claim challenged by the Government or adverse claimants, either because a satisfactory discovery under the increasingly

¹³⁶*Coleman v. United States*, 390 U.S. 599 (1968); *United States v. New Jersey Zinc Co.*, 74 I.D. 191 (1967); *United States v. Pittsburgh Pacific Co.*, 84 I.D. 282 (1977). See generally ch. 5, subsec. D(5).

¹³⁸See ch. 5, subsec. D(5).
¹³⁹30 U.S.C. §§ 29, 35, 37 (1976)

stringent valuable mineral deposit criterion was never made or because changing technology, costs, or mineral prices have made a deposit no longer “valuable.”

Three archaic provisions of the Mining Law add to the uncertainty with respect to tenure created by the valuable mineral deposit criterion. Each of the three provisions can create situations in which a good faith effort leading to discovery of a valuable mineral deposit can be completely nullified.

First, the Mining Law needlessly distinguishes between lode and placer deposits, and failure to locate a deposit properly as a lode or a placer will invalidate the attempted location.

Second, a valid lode claim, but not a placer claim, carries with it certain extralateral rights to any vein the apex of which lies within the boundaries of the claim: the dip of the vein maybe followed and mined beyond the sidelines of the claim. The extralateral rights flowing from location of the apex of the vein will take precedence over any claim located along the dip of the vein, even if the claim along the dip was located and proved by discovery of the vein prior to the time the apex claim was located.

Both of these provisions, and their inappropriateness under modern conditions, are discussed in subsection C(2)(a).

The third provision, which is also an anachronism,¹³⁹ is the tunnel site provision, which gives a person who diligently digs a mining tunnel the right to possess and work 1,500 feet of all veins discovered in the first 3,000 feet of the tunnel, as long as such veins were not previously known to exist. The possessor right to 1,500 feet of the vein will take precedence over any claim located by another person after the commencement of the digging of the tunnel unless the vein appears on the surface.¹⁴⁰

One of the most serious problems involved in acquiring development and production tenure under the Mining Law is the lack of adequate provisions for obtaining use of or title to land for various surface uses and facilities related to the mining operation. Lode claims cannot extend more than 300 feet in width on either side of the vein, and placer claims are limited to 20 acres for an individual claimant. There must be an actual discovery of a valuable mineral deposit on each lode or placer claim, so that little room is left for any surface facilities on the mining claim itself.

The Mining Law does authorize location and patent of a maximum of 5 acres of nonmineral land in connection with a lode or placer claim if such land is used or occupied by the proprietor of the claim for mining or milling purposes.¹⁴¹ “Mining or milling purposes” generally include any function or use directly connected with or facilitating the removal and processing of the ore—for example, pumping works, miners’ accommodations, mine offices or shops, ore storage, or waste and tailings disposal. The area located and used for mining and milling purposes is called a millsite.¹⁴²

There are substantial limitations on the location and use of millsites. First, each millsite is limited to a maximum of 5 acres. Second, the millsite must be on nonmineral ground, yet it is often difficult to establish the nonmineral character of the ground

¹³⁹PLLRC Nonfuel Legal Study, note 8, at 1093.

¹⁴⁰30 U.S.C. § 27 (1976); 43 CFR subpt. 3843 (1977).

¹⁴¹30 U.S.C. § 42 (1976). The cited provision also authorizes loca-

tion and patent of a millsite not connected with a mine on which a “quartz mill or reduction works” has been constructed.

¹⁴²Harris, note 37, at 124-126.

located, especially given the sensitivity of the valuable mineral deposit criterion to shifting costs and prices. Third, although a separate millsite may be located for each lode or placer claim, only those millsites that are actually occupied and being used for mining or milling purposes are valid. Land may not be held for prospective use. Fourth, functions and uses must be organized to take up the least amount of space. Fifth, the millsite is only as secure as the claim with which it is associated. If the claim is invalidated, the millsite will fall with it. Finally, the Secretary of the Interior may have discretion to refuse to issue a patent for a millsite.¹⁴³

These limitations were probably not too restrictive in 1872 when mining operations were small, involved high-grade deposits, and were not faced with substantial competition for the use of nonmineral land. Today, however, the typical mine encompasses a large, low-grade ore body that is often mined in an environment of intense competition for the surface use of land. Such a mine produces enormous quantities of waste rock and tailings that must be disposed of. If it is an open pit mine, it will have deep slanting pit walls. There will be crushing and processing plants and other customary facilities. The size of the operation requires careful advance planning for the life of the mine. But advance planning is impossible with millsites because of the requirement of present occupancy and use. And, even if millsites could be held for prospective use, it is highly doubtful that they could satisfy all the demands for surface space. There could be at most as many millsites as there are mining claims, and each millsite would be at most one-fourth the size of the typical 20-acre claim, so that the millsites, in the aggregate, would be one-fourth the size of the ore body encompassed by the claims. Yet the ore body is itself likely to be smaller than the area required either for pit slopes or disposal of waste rock or tailings.

Because the Mining Law does not adequately provide for land needed for surface facilities and uses, the miner must seek to obtain such land independently through purchases and exchanges.¹⁴⁴

b. Maintaining Development and Production Tenure: Patents and Assessment Work

A patented claim is no longer Federal land: legal ownership of the entire claim is transferred from the Federal Government to the mineral claimant free from any controls or requirements with respect to mineral development or surface use.¹⁴⁵ The holder of an unpatented claim has a possessor right to use the claim and its surface for mining purposes. This possessor right is vested against the Government as well as other miners once a discovery of a valuable mineral deposit has been made, and it continues indefinitely unless it can be proved at some point that the deposit is no longer valuable or that the required assessment work (see below) has not been done.¹⁴⁶

There is no requirement that mineral production ever be commenced, nor any effective legal incentive for diligent development, on either patented or unpatented

¹⁴³Ibid., at 118-126, 130, 133-135; see *Utah International, Inc.*, 36 I.B.L.A. 219 (1978), discussed in *Mining Cong. J.*, October 1978, at 73, 85.

¹⁴⁴PLLR Nonfuel Legal Study, note 8, at 1047-1050, 1093.

¹⁴⁵Title to the leasable minerals will be reserved in the Federal Government if the claim is subject to a mineral permit or lease, or a permit or lease application is pending, or the land is known to be

valuable for a leasable mineral at the time the patent is issued. See ch. 3, subsec. D(6).

¹⁴⁶Although the possessory right is vested, the right to obtain a patent may not be—that is, it may be subject to being cut off by a new law. See *United States v. Rizzinelli*, 182 F. 675, 681 (D. Idaho 1910); *United States v. Mulligan*, 177 F. Supp. 384 (D. Ore. 1959).

claims. Claims continue indefinitely without payment of any holding charges, and there are no limitations on the total number of claims that can be held by a single person. The closest thing to a diligence requirement is the requirement, for unpatented claims only, that \$100 worth of labor be performed or \$100 worth of improvements be made annually on each claim. But this so-called "assessment work" requirement, as is shown below, is very difficult to enforce in practice and, even when complied with, is insufficient to ensure diligent development.

The \$100 figure was established in 1872 as the minimum value of the required assessment work. It has not been increased since. Individual States can require more than the minimum \$100 worth of work each year, but apparently none have done so. Assessment work requirements on one claim in excess of the \$100 minimum maybe applied to satisfy the work requirement on adjacent claims being developed or worked under a common plan.¹⁴⁷ (Compare the *pedis possessio* and discovery-of-a-valuable-mineral-deposit requirements, which must be satisfied individually on each claim.)

Failure to perform the required assessment work opens the claim for which such failure occurred to location by others, unless the initial claimholder resumes assessment work first. Until recently, the courts held that failure to perform the work would not subject the claim to cancellation by the Federal Government. In 1970, however, the Supreme Court indicated that such cancellation would be authorized for claims to leasable minerals that were located prior to the time such minerals were made leasable.¹⁴⁸ The Department of the Interior has issued regulations that purport to authorize cancellation of any claim for failure to perform the required work,¹⁴⁹ but it is not clear that the Supreme Court's holding can be extended so far.

Unfortunately, it is difficult to determine in practice whether the required assessment work has been performed. The courts have held that the work need only be performed for the benefit of the claim and not necessarily on the claim, so that work performed some distance from the claim may suffice. Moreover, the particular allowable items of work or improvement are determined on a case-by-case basis and, depending on the court, may include such items as the expense of hiring a watchman for a temporarily idle mine. On-the-ground geological, geochemical, or geophysical surveys are allowable items for no more than 2 consecutive years or a total of 5 years. Almost any work on the claim is arguably allowable, so that a person who wishes to relocate the claim (or the Government if it wishes, and is authorized, to cancel the claim) faces an uncertain and probably lengthy and expensive legal dispute with the claimholder, especially since the claimholder need only prove resumption of work prior to the attempted relocation or cancellation in order to prevail (work missed in previous years need not be made up).¹⁵⁰

Except for geological, geochemical, or geophysical surveys, there is no Federal or State requirement to file any proof of performance of assessment work. Most States provide for, but do not require, the filing of an affidavit stating that the work has been done. The affidavit need not describe the work or contain any proof that it was done. Filing of the affidavit is "merely a convenient method of preserving *prima facie*

¹⁴⁷30 U.S.C. § 28 (1976).

¹⁴⁸*Hickel v. Oil Shale Corp.*, 400 U.S. 48 (1970).

¹⁴⁹43 CFR §3851.3(a) (1977).

¹⁵⁰*PLLR Nonfuel Legal Study*, note 8, at 578-610

evidence of the performance of the assessment work. ” In most States, anyone wishing to relocate the claim bears the burden of proving that the assessment work was not done, even if no affidavit was filed.¹⁵¹ The Federal Government now requires annual filing of either a notice of intent to hold onto a claim or a copy of any affidavit of assessment work filed with the State. Failure to file one or the other will be deemed conclusively to constitute an abandonment of the claim.¹⁵² This new Federal requirement should eliminate a large number of stale, abandoned claims, but it does not in any way help those who wish to relocate or cancel a claim that has not been abandoned but apparently is being held without performance of the required work.

Given the great difficulty of ascertaining and proving that assessment work has not been done on a claim, particularly in light of the small amount of work (\$100 worth per claim) required, neither other miners nor the Government are eager to contest a claim even when it appears not to have been maintained by the required work. Another miner will usually either pass the claim over or seek to lease or purchase it, and the Government will ignore it unless it is a significant obstacle to some Federal program (especially since the Government’s authority to cancel most claims for failure to perform assessment work is unclear).

Even when assessment work is done, so that a claim or group of claims is actually validly maintained, the amount of work required is so small that a claim can be held indefinitely without ever producing from or even significantly developing it. One hundred dollars’ worth of work as late as 1890, when the average wage was 20 cents per hour and average annual earnings were less than \$480, amounted to a significant and bona fide contribution to development of a claim. In 1872, when the \$100 yearly work requirement was established, it probably represented a good summer’s work, at least.¹⁵³ But \$100 today is a drop in the bucket.

Some people in the mineral industry argue that \$100 worth of work per claim still represents a substantial, bona fide effort. They reason that the mineral targets being explored today generally encompass 50 or more claims, in contrast with the one-or-few claim deposits prevalent in 1872, so that the effort per deposit is roughly the same now as in 1872, at least during the initial stages of exploration.¹⁵⁴ This argument may be correct for the initial reconnaissance stages of exploration of large targets, but those are not the stages for which the assessment work requirement was designed. Rather it was designed to ensure diligent, good faith development after discovery of a valuable mineral deposit. (The literal language of the law requires that discovery precede location of a claim.) Diligent, good faith exploration is a *pedis possessio* problem,” Average expenditures per acre per year today during the development stage are estimated to be in the thousands of dollars for almost every type of deposit. Even during the earlier detailed exploration stages, expenditures per acre per year today are estimated to be \$10 or more for stage 3 (detailed surface investigation) and hundreds of dollars for stage 4 (detailed three-dimensional physical sampling) for almost every type of depos-

¹⁵¹Ibid., at 594-595, 602-604.

¹⁵²43 U.S.C. § 1744 (Supp. I 1977); 43 CFR pt. 3830, published at 42 F.R. 5298, 5301 (1977).

¹⁵³O’Callaghan, “The Mining Law and Multiple Use,” in University of Arizona, College of Mines, *Symposium on American Mineral Law Relating to Public Land Use* 31 (J.C. Dotson ed. 1966).

¹⁵⁴E.g., Bailly, “Mineral Exploration and Mine Developing Problems,” at 37-38, paper presented at the Public Lands Law Conference, University of Idaho, Oct. 10, 1966, and updated June 30, 1967.

¹⁵⁵See subsec. C(2)(b).

it.¹⁵⁶ In contrast, the \$100 per claim per year assessment work requirement translates to only \$5 per acre per year for a typical 20-acre claim.

Thus, the assessment work requirement is set far too low to assure diligent detailed exploration or development, except perhaps for the initial surface investigation stage of detailed exploration. Instead, the requirement results in needless annual scarring of the land with bulldozers or dynamite charges by those who wish to hold on to claims but are unable or unwilling to conduct genuine activities during one or more years.¹⁵⁷

In order for the assessment work requirement to serve as an adequate assurance of diligent development, the value of the annual work required would have to be escalated rapidly after the first 1 or 2 years to approach the hundreds of dollars per acre per year spent, on the average, on actual subsurface exploration and then the thousands of dollars per acre per year spent, on the average, on actual development of a deposit. In that case, "banking" of work should be allowed—that is, expenditures in excess of the requirement for 1 year should be credited against work required in future years—to provide the flexibility in timing needed for efficient exploration and development, and to avoid unnecessary surface damage resulting from makework that would otherwise be required during lulls in mineral activity. Additional flexibility and avoidance of needless work could be attained by allowing the mining claimant to pay some or all of the value of the required work to the Government rather than actually performing the work. Finally, more effective provisions for enforcing the assessment work requirement would have to be adopted. For example, a mining claimant could be required to file annually a document describing the type and value of work done on or for the benefit of the claim (perhaps including proof of the work done) or evidence of payment in lieu of work if such payment is allowed. Failure to file the document would automatically terminate the claim. Both the Government and third parties should be allowed to disprove assertions of performance of work made in such a document.

The mining industry has recommended changes in the assessment work requirement similar to those outlined in the previous paragraph.¹⁵⁸ However, it would only raise the value of work currently required (\$5 per acre per year assuming the typical 20-acre claim) to a maximum requirement of \$20 per acre per year after 15 years, which seems inadequate to assure diligent detailed exploration or development,

Additional changes in the assessment work provisions might include limitation of the amount of land that could be treated as a unit for assessment work purposes¹⁵⁹ and termination of the assessment work requirement after development has been completed and production has begun. 'ho

¹⁵⁶See ch. 2, table 2.6 and subsec. D(3) and D(4), and app. C, tables C.2 through C.5.

¹⁵⁷See ch. 5, subsec. D(2)(a).

¹⁵⁸See "Declaration of Policy of the American Mining Congress," *Mining Cong. J.*, November 1977, at 66, 75; Office of Technology Assessment, U.S. Congress, *Draft Proceedings of the OTA*

Workshop on Legislative Strategies for Mineral Accessibility on Onshore Federal Land, July 29, 1976, at 27, 33.

¹⁵⁹See subsec. B(3).

¹⁵⁹Compare the work requirements for geothermal steam and oil shale leases discussed in subsecs. C(3)(b) and D(3)(c).

3. Development and Production Tenure Under the Mineral Leasing Laws

a. Acquiring Development and Production Tenure in Known Mineral Areas: Competitive Leases

Mineral rights for known mineral areas are issued through competitive bonus bidding.¹⁶¹ As was discussed in detail in subsection B(2), the distinction between known and unknown mineral areas has been defined differently for different minerals, creating unnecessary complexity and confusion for the mineral industry and the responsible Federal agencies. Generally, however, a known mineral area must be an area where the character and extent of mineralization are known or can be estimated with a reasonable degree of confidence, so that only limited predevelopment tract evaluation exploration will be necessary prior to commencing development, rather than the riskier deposit-location type of exploration necessary in unknown mineral areas. Competitive leases, therefore, are essentially development and production leases, except for those geothermal leases that are issued competitively because of overlapping noncompetitive lease applications or proximity to nearby discoveries.

Competitive leases are issued at the discretion of the Secretary of the Interior, who may refuse to put a known mineral area up for competitive bidding or may reject all bids. Considerable administrative effort is required to determine whether the highest qualified bid is adequate payment for the mineral resource, especially when demand for the resource currently is low but may increase substantially in the future as a result of improvements in technology (e. g., oil shale, geothermal steam, coal gasification and liquefaction), shifts in environmental and other legal requirements (e.g., low sulfur coal), or decreased availability of substitute minerals (e.g., coal, oil shale, and geothermal steam as substitutes for oil and gas).¹⁶²

Each application for a competitive lease must be accompanied by a \$10 filing fee (except that no fee is required for competitive geothermal or oil and gas leases) and the first year's rental. All leases must be taken in reasonably compact form according to the legal subdivisions of the public land surveys or, if not surveyed, by a special survey. The maximum size of each lease is 2,560 acres, except for sulfur or oil and gas leases (640 acres), oil shale, native asphalt, or tar sand leases (5, 120 acres), and coal leases (no maximum size, but each logical mining unit is limited to 25,000 acres).¹⁶⁴ leases are noted on the official land tract books and maps.

b. Acquiring Development and Production Tenure Through Successful Exploration in Areas Where Mineral Deposits Were Not Known to Exist: Preference-Right Leases and Noncompetitive Leases

Development and production tenure is acquired in areas not previously known to contain mineral deposits through successful exploration under a prospecting permit or

¹⁶¹ Competitive bidding is required by law only for coal or known oil, gas or geothermal mineral areas. 30 U.S.C. §§ 201(a), 226(b), 1003 (1976). Known mineral areas of the other leasable minerals are generally subject to lease through "advertisement, competitive bidding, or such other methods as [the Secretary] may by general regulation adopt." E.g., 30 U.S.C. § 283 (1976). The Secretary has adopted competitive bonus bidding for all known mineral areas.

See subsection B(2) and app. A.

¹⁶² 43 CFR §§ 3103.2 (oil and gas), 3205.2(a), 3205.3-1 (geothermal steam), 3503.2 (other minerals). The rentals for the various minerals are discussed in subsec. D(3)(c).

¹⁶⁴ 30 U.S.C. §§ 201(a) & (d)(7) (coal), 211(a) (phosphate), 226(b) (oil and gas), 241(a) (oil shale, native asphalt, solid and semisolid bitumen, bituminous rock), 262 (sodium), 273 (sulfur), 283 (potassium), 1006 (geothermal steam) (1976); 43 CFR § 3521.2-2(c)(3) (1977) (hardrock minerals).

noncompetitive lease, depending on the mineral. As was discussed in subsection C(3)(a), a prospecting permit or noncompetitive lease authorizing exclusive exploration of a tract of land for a specified leasable mineral is issued to the first applicant.

The law generally provides that the holder of a prospecting permit “shall be entitled to a lease for any or all of the land embraced in the prospecting permit” upon showing to the satisfaction of the Secretary of the Interior “that valuable deposits of [the mineral covered by the permit] have been discovered by the permittee within the area covered by his permit” and, for sulfur, sodium, or potassium permits, “that such land is chiefly valuable therefor.”¹⁶⁵ The lease that is issued as the result of such a discovery is called a preference-right lease. A preference-right lease will be issued only if there has been a discovery of a valuable deposit of the mineral specified in the permit; discovery of a valuable deposit of some other mineral will not suffice.”) Thus, a preference-right hardrock mineral lease apparently will not be issued unless there has been discovery of a valuable deposit of the dominant hardrock mineral or minerals required to be specified in the permit,¹⁶⁷

The provision authorizing issuance of coal prospecting permits was repealed in 1976,¹⁶⁸ but there are still many pending applications for preference-right coal leases based on asserted discoveries of valuable deposits of coal under permits issued prior to 1976.¹⁶⁹

The “valuable deposit” criterion for issuance of a preference-right lease is the same criterion that determines the validity of mining claims located under the Mining Law.¹⁷⁰ Thus, there is no right to a lease unless the permittee can show that the deposit can be presently mined and marketed at a profit, using available technology, and taking all costs (extraction, processing, transportation, environmental protection, rehabilitation, marketing, etc.) and even financing arrangements into account.” As is the case under the Mining Law, the use of the criterion can create considerable uncertainty with respect to acquisition of development and production tenure, since costs and mineral prices are often unpredictable.

Additional uncertainty is created by the requirement that sulfur, sodium, or potassium permittees show that the land is “chiefly valuable” for the mineral deposit before a preference-right lease can be issued. This requirement apparently expressly incorporates the “comparative value” test for granting development and production rights—that is, the land must be more valuable for mineral production than for non-mineral purposes,¹⁷² It has been suggested that the comparative value test is implicitly applicable to all preference-right lease applications, and that it was explicitly referred to for sulfur, sodium, and potassium only as a result of the history of land classification and withdrawals.¹⁷³

¹⁶⁵30 U.S.C. § 211(b) (phosphate), 262 (sodium), 272 (sulfur), 282 (potassium) (1976); 43 CFR § 3521.1-1(f) & (h) (1977) (hardrock minerals).

¹⁶⁶43 CFR §§ 3520.1-1(a), 3521.1-1(h) & (i) (1977); BLM Permit Form 3510-1 (1977).

¹⁶⁷Ibid.; 43 CFR § 3511.2-1(b)(2) (1977).

¹⁶⁸Federal Coal Leasing Amendments Act of 1976, § 4, 90 Stat. 1083, 1085 (1976).

¹⁶⁹The requirement for a coal lease is literally discovery of coal “in commercial quantities,” but “commercial quantities” has the

same meaning as “valuable deposit.” 43 CFR § 3520.1-1(c) (1977).

¹⁷⁰41 F.R. 2648, 18845 (1976).

¹⁷¹See subsec. D(2)(a).

¹⁷²See ch. 5, subsec. D(5).

¹⁷³Wright, Office of the Solicitor, U.S. Department of the Interior, *Draft Research Memorandum on Preference Right Leasing of Mineral Deposits on Land Owned by the United States*, Jan. 2, 1975, at 50-65, 101-108, 112-119. See also ch. 5, subsecs. D(5) and E(5).

Acquisition of development and production tenure by means of a prospecting permit followed by a preference-right lease is made even more uncertain because the Secretary of the Interior can and does wait until an asserted discovery has been made before deciding what rental, royalty, environmental protection, and other provisions should be inserted in the lease.¹⁷⁴ Except for statutory restrictions on rentals and royalties for certain minerals,]-’ the Secretary has wide discretion to insert whatever lease provisions are necessary “for the protection of the interests of the United States, for the prevention of monopoly, and for the safeguarding of the public welfare,”” even if such provisions might make it technically or economically impossible to develop and produce the discovered deposit.¹⁷⁷ Theoretically, then, exploration under a prospecting permit must proceed in almost complete ignorance of what the development-and-production-lease provisions will be if a valuable mineral deposit is discovered. In practice, however, the serious uncertainty that could result from such ignorance has been avoided in the past by the use of standard lease forms with rentals and royalties a t or near the statutory minimums and weak (if any) surface protection requirements.¹⁷⁸ However, there is no assurance that this practice will continue, particularly with respect to surface protection requirements. The Secretary’s ability to manipulate lease provisions also allows him to manipulate the valuable deposit determination, because the cost of complying with lease provisions must be taken into account in determining whether a deposit can be presently mined at a profit.¹⁷⁹

Lastly, even if the permittee can prove that he has discovered a valuable deposit and, if necessary, that the land is chiefly valuable therefor, he may have only a preferred right to a development-and-production lease, if one is issued, rather than an absolute right to demand a lease, even though the relevant sections state that the permittee “shall be entitled to a lease.” The legislative history of these sections is replete with statements that the permit tee obtains a “preference right to a lease.”¹⁸⁰ The relevant regulations and the standard prospecting permit form have consistently referred to the lease rewarded for discovery under a permit as a “preference right” lease. ’t{] The Bureau of Land Management, which is responsible for the issuance of mineral leases, defines “preference right” as:

The right of an individual applicant, or class of applicants, to apply for public lands or resources prior to the general public or to assert claims superior to those of other applicants. i^{ff}:

In cases involving preferential rights to mineral leases given to persons other than prospecting permittees, the Department of the Interior has clearly held that a preference right to a lease is not an absolute right, but only a right of first refusal if the Government decides to lease the land.¹⁸³ This is the usual interpretation of preference rights under the Federal land laws. There are indications that it is the interpretation

¹⁷⁴ *Montana Eastern Pipeline Co.*, 55 I.D. 189 (1935).

¹⁷⁵ See subsec. D(3)(c).

¹⁷⁶ 30 U.S.C. § 187 (1976).

See ch. 5, subsecs. E(3) and E(4).

¹⁷⁷ See *ibid.*, and subsec. D(3)(c) of this chapter.

¹⁷⁸ 43 CFR § 3521.1-1(c) (1977).

¹⁷⁹ E.g., H.R. Rep. No. 398, 66th Cong., 1st sess., 13-14 (1919) (coal permittee has “preferential right to a lease”); H.R. Rep. No. 1278, 86th Cong., 2d sess., 2 (1960) (phosphate permittee has “same preference right to a lease that permittees seeking leases for coal,

sodium, sulfur, and potash now have”); accord, S. Rep. No. 879, 86th Cong., 1st sess., 2 (1959). See generally *Draft Research Memorandum on Preference Right Leasing*, note 173.

¹⁸⁰ 43 CFR §§ 3520.1-1, 3521.1 (1977) (headings); BLM Permit Form 3510-1 (1977). Prior to 1976, the “preference right” lease reference was in the body of 43 CFR § 3520.1-1, rather than just in the heading.

¹⁸¹ U.S. Bureau of Land Management, *Glossary of Public Land Terms* 36 (1949).

¹⁸² E.g., *Elwyn C. Hale*, 62 I.D. 19 (1955).

that was meant to be applied to preference-right mineral leases resulting from prospecting permits. 'H' In practice, however, leases have been routinely granted to prospecting permittees who have discovered valuable mineral deposits. Not until recently has this practice been challenged, and the issue is still unresolved.¹⁸⁵

Development and production tenure under noncompetitive geothermal or oil-and-gas leases is much more certain, since it is granted along with the initial grant of exploration tenure. An explorer who obtains a competitive or noncompetitive geothermal or oil-and-gas lease obtains the right to explore for, develop, and produce any geothermal resource or oil or gas deposit, respectively, during the term of the lease. There is no valuable deposit criterion to be satisfied after exploration and prior to development and production, and the lease provisions governing development and production are established together with those governing exploration at the beginning of the lease term.

Each application for a preference-right lease must be accompanied by the first year's rental (\$1 per acre, but not less than \$20 total, for hardrock minerals; \$0.50 per acre for sulfur; \$0.25 per acre for all other minerals).¹⁸⁶ There is no filing fee.¹⁸⁷

The maximum size of each preference-right lease or noncompetitive lease for a particular mineral is the same as for competitive leases of the same mineral (see subsection a immediately above), except noncompetitive oil and gas leases are limited to 2,560 acres while competitive oil and gas leases are limited to 640 acres.

c. Maintaining Development and Production Tenure

Lease periods and other provisions relating to maintenance of development and production tenure vary considerably for the different leasable minerals, with no readily apparent reason (other than historical) for most of the differences. For the most part, however, the provisions applicable to leases of a particular mineral are the same whether the leases are competitive, noncompetitive, or preference-right leases.

With only a few exceptions, the lease provisions for each leasable mineral are inadequate to assure diligent development and commencement of production. They also create uncertainty with respect to the long-term continuation of production rights.

(i) Lease Periods and Adjustment of Lease Provisions. The lease period for each leasable mineral is presented in table 4.2. The table also indicates whether and under what conditions a renewal or extension may be obtained for leases that have fixed primary periods, and whether and how often the Secretary of the Interior may adjust the lease provisions to accommodate changed circumstances.

Coal leases issued prior to August 4, 1976, and all phosphate and potassium leases are issued for indeterminate periods—that is, they last indefinitely as long as

¹⁸⁵E.g., 30 U.S.C. § 272 (1976) (sulfur permittee has "privilege" of leasing); see S. Doc. No. 392, 65th Cong., 3d sess. 15 (1919); 58 Cong. Rec. 4873 (daily ed. Aug. 30, 1919) [remarks of Senator Lenroot]; *Duesing v. Udall*, 350 F.2d 748 (D.C. Cir. 1965), cert. denied, 383 U.S. 912 (1966); *Draft Research Memorandum on Preference Right Leasing*, note 173.

¹⁸⁶A 1973 decision of the Department of the Interior's Board of

Land Appeals raised but refused to decide the issue. *Stanford R. Mahoney*, 12 I.B.L.A. 382, 388 (1973). See *Natural Resources Defense Council, Inc. v. Berkland, Civ. No. 75-0313* (D.D.C. June 30, 1978), appeals docketed, Nos. 78-1757, 78-1787, 78-1842 (D.C. Cir. Aug. 7, 11, 21, 1978).

¹⁸⁷43 CFR § 3521.1-1(f) (1977).

¹⁸⁸*Ibid.*, § 3503.2-2(b).

Table 4.2—Lease Tenure: Lease Period and Adjustability of Lease Provisions

Mineral leased	Initial lease period (primary period)	Extension of Initial lease period	Preferential right to renew lease	Adjustment of lease provisions
Phosphate or potassium	Indeterminate (20yrs. and so long thereafter as terms compiled with)	—	—	May be adjusted every 20 years
Coal leased before 8/4/76 after 8 '3/76	Indeterminate 20 years, but terminates after 10 years if no production	— So long as coal produced annually in commercial quantities	—	Every 20 years End of primary term and every 10 years thereafter
Oil shale	Can be indeterminate, but 20 years for prototype leases	Prototype leases: so long as production in commercial quantities	—	Prototype leases every 20 years
Oil or gas	Initial 5 years for competitive or 10 years for noncompetitive, plus 2 years if then drilling	So long as producing or capable of producing in paying quantities or reworking or redrilling	—	—
Geothermal steam	Initial 10 years, plus 5 years if drilling at end of initial 10 years	Up to 40 years after initial 10, so long as producing or utilizing in commercial quantities	For another 40 years	Every 10 years (20 for rentals/royalties) beginning 10 yrs. (35 for rentals/royalties) after steam produced
Sulfur	None mentioned in law, but 20 years under regulations	—	For successive 20-year periods	Every 20 years
Sodium	20 years	—	For successive 10 year periods	Upon each renewal
Hard rock minerals	Maximum of 20 years under regulations	Unconditioned right to renew for successive 10-year periods	—	Upon each renewal

the terms and conditions of the lease are complied with.¹⁸⁸ The terms and conditions of each lease are subject to reasonable readjustment by the Secretary of the Interior at the end of each 20-year period. Recently, the Secretary has promulgated regulations that apparently require that each coal lease adjusted after August 4, 1976, be limited to a 20-year period and so long thereafter as coal is produced annually in commercial quantities.¹⁸⁹

A coal lease issued on or after August 4, 1976, is limited by law to **20 years** and so long thereafter as coal is produced annually in commercial quantities. It will be terminated at the end of 10 years if it is not then producing coal in commercial quantities, and its terms are subject to readjustment at the end of the initial 20-year period and at the end of each 20-year period thereafter.¹⁹⁰

¹⁸⁸Act of February 25, 1920, § 7, P.L. No. 146, 66th Cong., 2d sess., ch. 85, 41 Stat. 439 (1920), amended Aug. 4, 1976 by Federal Coal Leasing Amendments Act of 1976, § 6, P.L. No. 94-377, 90 Stat. 1087 (1976), codified in 30 U.S.C. § 207 (1976) (coal); 30

U.S.C. § 212 (1976) (phosphate); *ibid.*, § 283 (potassium).
¹⁸⁹43 CFR § 3520.2-1 (1977), published in 42 F.R. 25470 (1977).
¹⁹⁰30 U.S.C. § 207(a) (1976).

Coal leases issued or adjusted after August 4, 1976, are therefore now similar to leases of the other leasable fuel minerals. For example, the prototype oil-shale leases issued in 1974 were issued for 20 years and so long thereafter as production in commercial quantities is maintained, and they are subject to readjustment every 20 years.¹⁹¹ It is likely that future oil-shale leases will be issued on similar terms, even though the law allows (but does not require) leases of oil shale, native asphalt, solid and semisolid bitumen, and bituminous rock to be issued for indeterminate periods.¹⁹²

Similarly, oil and gas leases are issued for initial periods of 5 years if issued competitively, or 10 years if issued noncompetitively, and so long thereafter as there is a well on the lease producing or capable of producing in paying quantities, or being reworked or redrilled after having produced in paying quantities. The initial period is extended for 2 years if drilling is underway at the end of the period.” The law does not provide for adjustment of the lease terms and conditions.

Geothermal leases are issued for an initial period of 10 years and are extended for an additional period of up to 40 years so long as geothermal steam is being produced or utilized in commercial quantities. The initial 10-year period is extended for 5 years if drilling is underway at the end of the period, and a lessee has a preferential right to renew the lease for another 40 years after the end of the first **50** years. Geothermal lease provisions other than rental and royalty rates are subject to readjustment every 10 years beginning 10 years after geothermal steam is produced; rentals and royalties are subject to readjustment every 20 years beginning 35 years after geothermal steam is produced.¹⁹⁴

By regulation, hardrock minerals are leased for a maximum initial period of 20 years with an unconditional right to renew for successive 10-year periods. In effect, therefore, hardrock leases are issued for indeterminate periods, like phosphate and potassium leases and pre-1976 coal leases. Hardrock leases are subject to readjustment each time they are renewed.¹⁹⁵

Sodium leases must be issued for an initial period of 20 years with only a preferential right to renew for successive 10-year periods. The length of sulfur leases is not specified in the law, but the regulations apparently require them to be issued for an initial period of **20** years with a preferential right to renew for successive 20-year periods. Sodium and sulfur leases are subject to readjustment each time they are renewed.¹⁹⁶

None of the lease periods discussed above is by itself sufficient to assure prompt development. Actual mineral deposits, including even hardrock mineral deposits, normally can be developed in a few (1 to 5) years; they rarely require more than 15 years.¹⁹⁷ Yet phosphate, potassium, hardrock, or unadjusted pre-1976 coal leases continue indefinitely with no provision for automatic termination for failure to develop or

¹⁹¹38 F.R. 33189, 33193 (1973).

¹⁹²30 U.S.C. § 241(a) (1976). There are no regulations applicable to oil shale leases. There are a few regulations applicable to asphalt leases, but it is not clear whether the regulations refer to asphalt in Oklahoma leased under a special law or asphalt in general, including perhaps bitumen and bituminous rock. See, e.g., 43 CFR § 3500.0-3(a)(6) & (c)(2), 3500.1-1, 3500.1-3(b), 3501.1-4(b)(6), 3501.3-2(b)(2)(v), 3503.3-1(b)(5), 3504.1-2(b), 3520.2-1(a)(1),

3521.2-2, 3521.3-1(a), 3521.4-2, 3562 (1977).

¹⁹³30 U.S.C. § 226(e) & (f) (1976).

¹⁹⁴Ibid. §§ 1005, 1007.

¹⁹⁵43 CFR §§ 3520.2-1(a)(2), 3522.1-2(c) (1977).

¹⁹⁶30 U.S.C. § 262 (1976) (sodium); 43 CFR §§ 3520.2-1, 3522.1-2(b) (1977) (sodium and sulfur).

¹⁹⁷See ch. 2, table 2.6 and subsec. D(4), and app. C, tables C.2 through C.4.

produce within a certain number of years. Similarly, sodium and sulfur leases last for an initial period of 20 years, and the lessee then has a preferential right over all other potential lessees to renew for additional periods whether or not development or production has occurred.

The continuation of fuel mineral leases, including coal leases issued or adjusted on or after August 4, 1976, is conditioned on commencement of production¹⁹⁸ after a certain number of years. But the number of years specified for coal (10 years) or oil and gas (12 years for noncompetitive leases, 7 years for competitive leases) is several times the normal 1- to 3-year period required for development of these minerals.¹⁹⁹ (A few of the years allowed in excess of the normal time required for diligent development may be required for completion of detailed exploration in advance of development, particularly for noncompetitive oil and gas leases.²⁰⁰) The 15 years for geothermal steam and 20 years for oil shale may more closely reflect the time currently required for development of these minerals, given the serious technological and environmental problems yet to be solved prior to substantial production of either mineral.”” But these periods could also be longer than normally required when and if the problems are solved.

Development times in excess of 10 years are almost always the result of delays in starting up or continuing development—delays due to lack of capital, markets, sufficient high-grade ore, technology, production capacity, infrastructure, desired profit margin, or required environmental clearances²⁰² rather than time actually spent on development. The Secretary of the Interior may authorize suspension of operations and may extend the lease period in many of these instances.²⁰³ It is not clear that delays in some of the remaining instances are in the public interest—for example, delayed development due to lack of capital to finance development, or due to abundant reserves of ore in more profitable mines owned by the same company, when another company would be willing and able to begin development immediately.

Some deposits, however, may require much more than the normal time to develop because of their low grade, geologic complexity, depth, or geographic remoteness. A maximum period of 5 or even 10 years for completion of development and commencement of production could prevent or negate good faith efforts to develop such deposits.

It is not possible to establish a required period for starting mineral production that will assure diligent development of the easier-to-develop deposits without precluding development of the harder-to-develop ones. Nevertheless, some maximum limitation—for example, 15 or 20 years—on the time allowed to complete mineral development and commence (or be capable of commencing) production seems advisable to prevent indefinite holding of Government land without development. At present, only the fuel mineral leases contain such a limitation.²⁰⁴

The lease period could be used to assure diligent development if it were conditioned on commencement of substantial development activity within a very few years

¹⁹⁸Oil and gas leases need only have a well capable of producing, rather than actual production, unless the Secretary of the Interior has ordered that the well be produced.

¹⁹⁹See ch. 2, subsec. D(4) and app. C, tables C.3 and C.4.

²⁰⁰See app. C, tables C.3 and C.4.

²⁰¹See app. A, subsecs. F(4) and F(8).

²⁰²See ch. 2, subsec. D(4).

²⁰³E.g., 30 U.S.C. §§ 209, 1023 (1976); BLM Lease Form 3520-6, § 2(a) (1972). See subsec. F(4).

²⁰⁴See table 4.2.

after issuance of a lease, and continuation of such activity until production is possible, subject to extensions or suspensions authorized by the Secretary of the Interior. But no mineral leases at present contain such a condition, Geothermal and oil and gas leases require that drilling be underway at the end of a certain number of years unless there is a well on the leased land capable of producing (see table 4.2). But the drilling requirement is more of an exploration requirement than a development requirement; it does not come into play until 5 or 10 years have elapsed and it does not require that the drilling be continued until there is a well capable of producing.

Conditions placed on the lease period to assure diligent production are also a problem. The fuel mineral leases are generally extended after their primary period only as long as the mineral under lease is produced annually in commercial quantities (oil and gas leases are also extended as long as there is a well capable of producing in paying quantities, unless the Secretary orders that the well be produced). The nonfuel mineral leases contain no such condition on the continuation of the lease period. (See table 4.2.)

The requirement of annual production for the fuel mineral leases can result in inefficient production. In any given year, the price of the mineral may be insufficient to cover the production costs, or greater profits may be possible if production is delayed to some future time when the mineral will be more valuable or the cost of producing it will be less. In these and other situations, not involving monopolistic or oligopolistic practices, efficiency and mineral conservation are served by postponing production. The Secretary has the authority to authorize suspension of operations and production under, and extension of the term of, any mineral lease, in the interest of conservation.²⁰⁵ Thus he can suspend the annual production requirement in the sorts of situations mentioned above. Nevertheless, the procedure is cumbersome, and the lessee can never be sure the Secretary will actually authorize the suspension, especially when the suspension is sought in anticipation of higher profits in the future.

On the other hand, the absence of any production-related condition on the lease periods for the nonfuel minerals²⁰⁶ may allow Government land to be held for indeterminate periods without production, resulting in indefinite prolongation of unreclaimed damage to nonmineral resources and uncompensated interference with land use and land management planning.²⁰⁷

A possible solution might be the uniform adoption of the production-conditioned lease periods currently specified for the fuel minerals, with an added provision allowing the lessee to choose to pay substantial advance royalties in lieu of production during any 1 or more years after development has been completed. The completion of development is usually the best guarantee of timely and efficient mineral production. The substantial costs of preparing the lease for production can be recouped only by starting up and continuing production. Ordinarily, the lessee will want to recoup these costs and turn a profit as soon as possible. But he could choose to delay production in the interest of efficiency by paying the required advance royalty. Since it is an advance

²⁰⁵30 U.S.C. §§ 209, 1010 (1976); BLM Lease Form 3520-6 (1972) (hardrock minerals).

²⁰⁶Continuous production may be required for the hardrock min-

erals. See the language quoted in the text at note 222.

²⁰⁷ See ch. 5, subsec. E(7); cf. ch. 5, subsec. D(8).

royalty and can be credited against future royalties due on actual production, it should not significantly affect the efficient timing of production. It will, however, discourage a lessee from holding on to a lease that will not be produced again for many years, if ever,

Other provisions related to the lease period also create uncertainty with respect to the long-term continuation of production rights. Lessees of geothermal steam, sodium, or sulfur have only a preferential right to renew their leases after the end of the initial lease period. The Secretary may refuse to renew a lease for these minerals if he does not wish mineral operations to continue on the leased land. The resulting uncertainty is not a major problem for geothermal steam leases, since the initial lease period covers up to 50 years, but the sodium and sulfur leases have initial periods of only 20 years (see table 4.2).

Apart from the renewal provisions, uncertainty is created by the provisions for periodic adjustment of lease terms and conditions. Leases for each leasable mineral other than oil or gas²⁰⁸ are subject to such adjustment, generally at the end of the first 20 years of the lease and every 10 or 20 years thereafter, depending on the mineral (see table 4.2). Geothermal steam leases are not subject to adjustment until 10 years after production has been achieved, and rentals and royalties for such leases cannot be adjusted until 35 years after production has been achieved. The Secretary's power to adjust lease terms and conditions cannot be exercised arbitrarily or capriciously, but it nevertheless creates uncertainty regarding the nature and profitability of future production rights.

(ii) Work Requirements. Leases for some minerals are subject to specific work requirements that can, at the option of the Secretary of the Interior, result in cancellation of a lease if they are not complied with. For example, coal leases have always been subject to the conditions of diligent development and continued operation of the mine or mines, except when such operation is interrupted by strikes, the elements, or casualties not attributable to the lessee.²⁰⁹ Until very recently, however, the phrases “diligent development” and “continued operation” were not defined or elaborated by the Secretary of the Interior, and in the absence of such definition or elaboration, the Secretary was unwilling to cancel leases for failure to comply with the conditions, even when leases had been held for 10 years or more with neither development nor production.”) Moreover, as is discussed more fully below, the Secretary has permitted payment of advance royalties in lieu of compliance with the requirement of continued operation.

Regulations issued by the Secretary in 1976 define “diligent coal development” as timely preparation for and initiation of production so that commercial quantities of coal are produced within 10 years of issuance of the lease if the lease was issued after August 3, 1976, or within 10 years of June 1, 1976, if the lease was issued prior to August 4, 1976. Substantial extensions of time are permitted for leases issued prior to August 4, 1976.²¹¹ “Commercial quantities” is defined as one-fortieth (2.5 percent) of

²⁰⁸Although the law does not explicitly provide for adjustment of oil and gas leases, the Secretary could insert adjustment provisions in oil and gas leases under general authority granted by the law. See 30 U.S.C. §§ 187, 189 (1976).

²⁰⁹30 U.S.C. § 207 (1976).

²¹⁰See the GAO studies cited in notes 244 and 245.

²¹¹43 CFR §§ 3500.0-5(f) & 3520.2-5 (1977).

the lease (or logical mining unit) reserves for leases issued before August 4, 1976, and as 1 percent of the reserves for leases issued after August 3, 1976.²¹² Leases issued on or after August 4, 1976, shall be terminated, as required by recent amendments to the law, if they do not produce within 10 years, but leases issued prior to August 4, 1976, are subject under the regulations only to possible cancellation in whole or part for lack of diligent development.²¹³

In effect, the Secretary has nullified the diligent development requirement for coal leases issued after August 3, 1976, by equating it with the independent requirement, under the law, of obtaining production on such leases within 10 years after their issuance. The diligent development requirement for leases issued prior to August 4, 1976, is even weaker. There is no requirement for any coal lease, whenever issued, that any development activity ever be undertaken—a lease can be held for 10 years (or longer if issued prior to August 3, 1976) '1' without doing anything and can then be abandoned. Some incentive for "early" (within 10 years) development or abandonment of coal leases may be provided by the requirement under the law that no new coal lease be issued to anyone who has an outstanding coal lease that has been held for at least 10 years after August 4, 1976, and is not producing coal in commercial quantities.²¹⁵ But the restriction apparently does not apply to leases for which advance royalties are being paid.²¹⁶

The 1976 regulations define "continued operation" of a coal lease as the production of 1 percent of the coal reserves in each of the first 2 years after diligent development has been achieved, and an average of 1 percent per year, calculated over 3-year periods, thereafter.²¹⁷ However, as discussed more fully below, the Secretary has substituted payment of advance royalties for the continued operation requirement.²¹⁸ Nevertheless, as was discussed above, annual production in commercial quantities is necessary to maintain a coal lease issued or adjusted on or after August 4, 1976, once the first 20 years of the lease have elapsed. Payment of advance royalties does not affect this requirement related to the lease period.

Any coal lease, whenever issued, included within a logical mining unit (an area of land in which the coal resources can be developed in an efficient, economical, and orderly manner as a unit, with due regard to conservation of coal reserves and other resources) must be completely mined—that is, all its reserves must be produced—within 40 years after approval of the mining plan for that unit.²¹⁹ By regulation, the Secretary has made every coal lease by itself a logical mining unit.²²⁰ But the regulation maybe invalid with respect to leases issued before August 4, 1976, when the statutory provision authorizing creation of logical mining units was enacted.²²¹

²¹²Ibid.

²¹³Ibid., § 3523.2-1.

²¹⁴A complicating factor for leases issued prior to Aug. 4, 1976 is a requirement in the regulations that such leases subject to readjustment but not actually readjusted before Aug. 4, 1976 shall be readjusted to conform to the requirements for leases issued after that date if the lessee was not told there would be no readjustment. It is not clear that such retroactive adjustment is valid or, if it is, how it would affect the diligence requirements. Ibid., § 3522.2-1(b).

²¹⁵30 U.S.C. § 201(a)(2)(A) (1976).

²¹⁶Ibid.; see *ibid.* § 207(b).

²¹⁷43 CFR § 3500.0-5(g) (1977).

²¹⁸Ibid., § 3520.2-5(b).

²¹⁹30 U.S.C. § 202a (1976).

²²⁰43 CFR §§ 3500.0-5(d), 3520.2-6(a) (1977).

²²¹Compare 30 U.S.C. § 202a(5) (1976) with *ibid.*, § 202a(6). The committee report on the legislation which authorized creation of logical mining units seems to support the regulation's inclusion of all coal leases whenever issued: "[This bill] authorizes the Secretary to approve, or by regulation to require, the consolidation of Federal coal leases (*including leases in existence at the time of enactment*) . . . so as to form a 'logical mining unit.'" H.R. Rep. No. 94-681, 94th Cong., 1st sess. 21 (1975) (emphasis not in original).

The lease form for hardrock minerals on acquired land has a provision requiring the lessee to “carry on operations under this lease with reasonable diligence and to begin operations within _____ months and to continue production thereafter unless operations are interrupted by strikes, the elements, or casualties not attributable to the lessee.”²²² The form has generally been filled in to require commencement of production within a period of around 96 months (8 years), but the provision also permits the lessor to grant reasonable extensions of time for commencement of production, and such extensions have been granted for at least some of the lead leases in Missouri.²²³ As with coal leases, there is no requirement that development be commenced within any specified period of time.

Both geothermal and oil and gas leases are subject to regulations and lease provisions requiring the lessee to drill wells ordered by the Secretary of the Interior to insure proper and timely development and production, but this authority has been used only to prevent waste or drainage of the leased minerals rather than to assure diligent development.²²⁴

The only leasable minerals for which there are requirements relating to timely commencement and continuation of development activities, and not just completion of development after a longer-than-normally-required period, are geothermal steam and oil shale.

As was discussed more fully in subsection C(3)(b), beginning in the sixth year of a geothermal steam lease, escalating exploration expenditure requirements are tied to escalating rental requirements, and expenditures during the first 5 years of the lease, or in excess of the minimum required expenditures in the sixth and each succeeding year, may be credited against 1) required expenditures for future years or 2) the escalating portion of the required rentals. The net effect is a work requirement of approximately \$5 per acre (with the option to pay \$1 of the \$5 to the Government rather than spending it on work) for the sixth year of the lease, which escalates \$3 per acre each succeeding year until a work requirement of approximately \$17 per acre (of which \$5 can be paid to the Government rather than being spent on work) is reached for the 10th year. The requirement then escalates \$1 per year until a maximum work requirement of \$22 per acre (of which \$10 can be paid to the Government rather than being spent on work) is reached for the 15th year. Extra work can be “banked” and applied to work requirements in future years,

Although the escalating work requirement for geothermal leases is stated in terms of exploration expenditures, it applies to all lease operations and continues until production in commercial quantities is attained. It therefore covers the development stage as well as the exploration stage. It was noted in subsection C(3)(b) that the amount of annual work required is quite small compared to the hundreds of dollars per acre per year required on the average for actual detailed exploration. The work requirement is

²²²BLM Lease Form 3520-6 (1972).

²²³Doris Koivula, Chief, Branch of Upland Minerals, U.S. Bureau of Land Management, oral communication, February 1977.

²²⁴30 CFR §§ 221.9, 221.15 (1977); BLM Lease Forms 3110-3

(1973), 3110-1 (1977), 3120-7 (1977) (oil and gas); 30 CFR §§ 270.17, 270.33 (1977) (geothermal steam). See U.S. National Aeronautics and Space Administration, *Onshore Lease Management Program Study for the U.S. Geological Survey* 75 (1974).

even more inadequate during the development stage, when costs average thousands of dollars per acre per year.²²⁵

The prototype oil shale leases issued in 1974 require submission of a detailed development plan by the end of the third year of each lease. The plan must include a schedule of all activities to be conducted under the lease, and a requirement that the lessee use all “due diligence” in the orderly development of the leased deposits. The lessee must attain production at the minimum rate specified for minimum royalty purposes (see below) “at as early a time as is consistent with compliance with all the provisions of this lease.” A plan acceptable to the Secretary must be submitted within 2 years after submission of the original plan, less periods during which a submitted plan is being reviewed by the Secretary. Failure to submit an acceptable plan is grounds for termination of the lease, if the Secretary so elects. On approval of the plan, the lessee “shall proceed to develop the Leased Deposits in accordance with the approved plan.”²²⁶ The Secretary may initiate court proceedings for forfeiture and cancellation of a lease if the lessee fails to comply with any of the terms and conditions of the approved plan, and if such failure continues for **30** days after service of notice by the Secretary.²²⁷ It is not clear, however, whether the lessee’s proposed schedule for development is a “term or condition” of the development plan. If it is, then the oil shale lessee’s tenure depends not only on completion but also on commencement and continuation of development activities within certain specified times during the initial lease period, subject to waiver or suspension of such requirements by the Secretary of the Interior. (Suspensions were authorized for all the prototype leases in 1977.) The times, however, are specified by the lessee, and they maybe vague or open-ended,

Apparently, the development plan requirement for the prototype oil shale leases was designed mainly to control surface and other environmental impacts rather than to assure diligent development. Primary reliance was placed on certain economic incentives to assure diligent development.²²⁸ Chief among these economic incentives is the lease provision allowing the lessee to credit development expenditures incurred during the first 4 years of the lease against the bonus installments due at the end of the third and fourth years.²²⁹ Bonuses ranging from \$45 million to more than \$210 million were bid on the prototype leases,²³⁰ payable in five installments due, respectively, at the beginning of the lease and each year thereafter for the first 4 years of the lease. The installments due at the end of the third and fourth years can be avoided if a lease is surrendered or relinquished prior to the end of the third year. Otherwise, the tens of millions of dollars included in these last two installments must either be paid to the Government or expended on development operations. Ordinarily, a lessee will make every effort to spend the money on productive operations rather than pay it to the Government. The bonus credit provision is thus a strong incentive for early, substantial development activity,

Incentives for diligent development after the first 4 years of an oil shale lease are provided by the provision for crediting development expenditures against required

²²⁵See ch. 2, table 2.6 and subsec. D(4), and app. C, tables C.2 through C.5.

²²⁶38 F. R. 33191 (1973) (sec. 10).

²²⁷Ibid., at 33193 (sec. 29).

²²⁸*Current Mineral Laws of the United States*, House Comm. on

Int. & Ins. Affairs, 94th Cong., 1st sess. at 22-24 (Comm. Print No. 13, 1976).

²²⁹38 F. R. 33189 (1973) (sec. 5).

²³⁰*Current Mineral Laws*, note 228, at 21.

minimum royalties. A minimum royalty, due whether or not there has been actual production, is specified for the sixth and succeeding years of each lease, based on a predetermined production rate of approximately 1,000 to 2,000 tons for the sixth year, which increases by a like amount each succeeding year through the 15th year, and then remains the same through the 20th year, at which time the lease terms may be re-adjusted. Development expenditures made between the date of approval of the development plan and the end of the 10th lease year, and not already credited against the last two bonus installments, may be credited against the minimum royalties due in the 6th through 10th lease years.²³¹ For the 6th through the 10th years, then, the minimum royalty requirement is, in effect, an escalating development expenditure requirement similar to the escalating exploration and development expenditure requirement applicable to geothermal steam leases discussed above. In both cases, there is a very strong incentive to spend the money on development rather than “throw it down the drain” by paying it to the Government. And the sums required for oil shale leases are more substantial than those required for geothermal steam leases. Assuming a predetermined production rate (for minimum royalty purposes) of 1,000 tons of shale oil per day in the sixth year, increasing by 1,000 tons per day each succeeding year through the 15th year, the expenditure requirement (minimum royalty) at the basic lease royalty rate of \$0.12 per ton would be \$43,800 in the sixth year and \$219,000 in the 10th year. However, these sums are still rather small compared to the tens of millions of dollars per year required for normal mineral development.²³² Moreover, there is a countervailing incentive not to complete development and commence production prior to the end of the 10th year, since the lessee cannot credit development expenditures against the first \$10,000 of minimum royalty due in the sixth or any subsequent lease year if there is actual production in that year.’{{

Although development expenditures cannot be credited against minimum royalties due in the 11th through 20th years of an oil shale lease, the minimum royalties for these years provide some incentive for prompt development. They will be money “down the drain” unless actual production is commenced so that they can be credited against actual royalties due. Under the minimum production schedule assumed in the previous paragraph, the minimum royalty in the 11th and succeeding years would rise from \$262,800 in the 11th year to \$438,000 in each of the 15th through 20th years.

(iii) Rentals, Minimum Royalties, and Advance Royalties. Other than the lease periods and the specific production, expenditure, or other work-related requirements discussed so far in this subsection, the only lease provisions directly relevant to maintaining development and production tenure are the rental, minimum royalty, and advance royalty provisions.

Each mineral lease is conditioned on the payment of an annual rental, but the rentals are too low to act as an effective incentive for mineral development and production. Rentals for sodium or potassium leases are fixed by law at \$0.25 per acre for the first year of the lease, \$0.50 per acre for each of the second through fifth years,

²³¹Ibid., at 22-23; 38 F.R. 33190 [1973] (subsec. 7(e)).

²³²See ch. 2, table 2.6 and subsec. D(4), and app. C, tables C.2 through C.5.

²³³38 F.R. 33190 [1973] (subsec. 7(e)). However, any royalty due on actual production in the sixth, seventh, or eighth lease year

will be reduced by half the difference between the actual royalty due and the specified minimum royalty for that year if the actual royalty due exceeds the specified minimum royalty. Ibid. (subsec. 7(f)).

and \$1 per acre for each succeeding year.²³⁴ Rentals for sulfur, oil shale, native asphalt, solid or semisolid bitumen, or bituminous rock leases are fixed at \$0.50 per acre each year.²³⁵ Rentals for phosphate leases must be at least \$0.25 per acre the first year, \$0.50 per acre for each of the second and third years, and \$1 per acre for each succeeding year.²³⁶ Rentals for coal leases must be at least \$0.25 per acre the first year, \$0.50 per acre for each of the second through fifth years, and \$1 per acre for each succeeding year (no rental is required after the fifth year for coal leases issued after August 3, 1976).²³⁷ Rentals for hardrock mineral leases must be at least \$1 per acre, but not less than \$20 total, each year.²³⁸ Rentals for oil and gas leases must be at least \$0.50 per acre each year.²³⁹ Rentals for geothermal steam leases must be at least \$1 per acre each year.²⁴⁰

Even for those minerals for which minimum rather than fixed rentals are specified, the Department of the Interior has kept the actual rentals at or near the specified minimums. Rentals for noncompetitive oil and gas leases have only recently been raised to \$1 per acre, and rentals for competitive oil and gas leases are set at \$2 per acre.²⁴¹ Similar rentals are set for geothermal steam leases (taking into account only the basic rental, not the escalating portion that is in effect a work requirement).²⁴² Rentals for phosphate leases in the fourth and subsequent years have been set at \$3.50 per acre in some recent leases.²⁴³ Coal leases issued between 1970 and 1973 generally have rentals of \$1 per acre for each of the first 5 years and \$2 to \$13 per acre for the sixth and each succeeding year, depending on the quantity and quality of the coal.²⁴⁴ For coal leases issued since April 1973, the Department has essentially replaced the rental for the sixth and each succeeding year with a minimum advance royalty based on the quantity and quality of the coal (see below).²⁴⁵

A rental rate of even \$4 per acre would amount to a total annual lease rental of just over \$10,000 on even the largest (for most minerals) permissible lease of 2,560 acres. Smaller leases would require even less total yearly rental. The fixed or actual rental for most existing leases never exceeds \$1 per acre, or \$2,560 per year for the largest lease. These rental rates are insignificant compared to the tens of millions of dollars required for actual development of a lease,²⁴⁶ and they therefore have little or no effect on the decision whether or when to develop, as can be seen by the production history of oil and gas,²⁴⁷ coal,²⁴⁸ and other²⁴⁹ mineral leases.

Yet, as is the case with exploration,²⁵⁰ rentals set at a level comparable to the costs of actual development would greatly increase total costs to the lessee during the

²³⁴30 U.S.C. §§ 262, 283 (1976); 43 CFR § 3503.3-1(b)(3) (1977).

²³⁵30 U.S.C. §§ 241(a), 273 (1976); 43 CFR § 3503.3-1(b)(4) (1977).

²³⁶30 U.S.C. § 212 (1976).

²³⁷Act of February 25, 1920, § 7, P.L. No. 146, 66th Cong., 2d sess., ch. 85, 41 Stat. 439 (1920) (leases issued prior to Aug. 4, 1976); 30 U.S.C. § 207 (1976); 43 CFR § 3503.3-1(b)(1) (1977) (leases issued after Aug. 3, 1976).

²³⁸43 CFR § 3503.3-1(b)(6) (1977).

²³⁹30 U.S.C. § 226(d) (1976).

²⁴⁰*Ibid.*, § 1004(c).

²⁴¹43 CFR § 3103.3-2 (1977).

²⁴²U.S. General Accounting Office, *Problems in Identifying, Developing, and Using Geothermal Resources*, RED-75-330, Mar. 6, 1975, at 33.

²⁴³U.S. General Accounting Office, Letter B-118678 (RED-76-70), Feb. 5, 1976.

²⁴⁴U.S. General Accounting Office, *Improvements Needed in Administration of Federal Coal-Leasing Program*, B-169124, Mar. 29, 1972, at 24-25.

²⁴⁵U.S. General Accounting Office, *Further Action Needed on Recommendations for Improving the Administration of Federal Coal-Leasing Program*, RED-75-346, Apr. 28, 1975, at 7-8; U.S. General Accounting Office, *Role of Federal Coal Resources in Meeting National Energy Goals Needs to be Determined and the Leasing Process Improved*, RED-76-79, Apr. 1, 1976, at 21.

²⁴⁶See ch. 2, table 2.6 and subsec. D(4), and app. C, tables C.2 through C.4.

²⁴⁷See subsec. C(3)(b).

²⁴⁸See the GAO studies cited in notes 244 and 245.

²⁴⁹U.S. General Accounting Office, Letter B-118678 (RED-76-70), Feb. 5, 1976.

²⁵⁰See subsec. C(3)(b).

development stage without adding to the funds actually used for development. In effect, development costs would be artificially inflated to such an extent as to preclude efficient development. Rentals set too low to significantly affect costs provide no incentive for diligent development, but if they are set high enough to significantly affect costs they will preclude efficient development,

Straight rentals, therefore, seem to be an inappropriate device for assuring diligent mineral development. However, they can be very important for efficient land use and management if they are viewed, as may have been originally intended, as charges for the use of the land rather than as charges to ensure diligent mineral activity.:"

The primary means for assuring diligent development of and continued production from phosphate, potassium, sodium, and sulfur leases is the requirement of payment of royalty on a minimum annual production beginning in the fourth year of a phosphate lease or the sixth year of a potassium, sodium, or sulfur lease. The requirement is imposed by law for phosphate and potassium leases and by regulation for sodium and sulfur leases.²⁵² But it has been nullified in practice, because the minimum royalty for a lease is invariably set at the same level as the annual rental, and rentals for a given year can be credited against the royalties due in that year. In effect, therefore, there is only a rental and no minimum royalty.²⁵³

Rentals on oil and gas leases are replaced by a minimum royalty of \$1 per acre per year after there has been a discovery of oil or gas in paying quantities.") Similarly, the escalating rental and expenditure requirements in geothermal steam leases are replaced by a minimum royalty of \$2 per acre per year after commencement of production in commercial quantities.²⁵⁵ These charges relate to the production rather than the development stage, and they are too small to act as an incentive for actual production.

Even if minimum royalties were based on calculations of minimum actual reasonable production, as was intended by Congress for phosphate and potassium, rather than designed as rental substitutes, it is not clear that the required payments would be sufficient to assure diligent development. One estimate of the royalty for reasonable minimum annual production from a phosphate lease in 1976 amounted to only about \$23 per acre,²⁵⁶ a figure still well below the thousands of dollars per acre per year required, on the average, for actual mineral development." A lessee would not be likely to commence development or production solely in order to avoid payment of the minimum royalty.

Both rentals and minimum royalties are credited against actual royalties due in the same year. They therefore provide at least some incentive for early commencement of production, because, until production is commenced, rental and minimum royalty payments are "water down the drain" and cannot be credited against future royalties due on actual production. The longer production is delayed, the longer there will be in effect double payments for future actual production. As noted immediately above,

²⁵²See ch. 5, especially subsec. E(6).

²⁵³30 U.S.C. § 212 (1976) (phosphate); *ibid.*, § 283 (potassium); 43 CFR § 3503.3-2(b)(2) & (3) (1977) (all four minerals). The year for commencement of payment is specified by regulation rather than by law for all four minerals.

²⁵⁴U.S. General Accounting Office, Letter B-118678 (RED-76-70).

Feb. 5, 1976.

²⁵⁵30 U.S.C. § 226(d) (1976).

²⁵⁶*Ibid.*, § 1004(d).

²⁵⁷U.S. General Accounting Office, Letter B-118678 (RED-76-70), Feb. 5, 1976.

²⁵⁸See ch. 2, table 2.6.

however, the dollar amount going “down the drain” may be too small to significantly affect development and production decisions.

The minimum royalties required for the prototype oil shale leases were designed to provide more substantial incentives for development. Due initially in the sixth lease year, the minimum royalty escalates from several tens of thousands of dollars in the sixth year to several hundred thousand dollars in the 15th through 20th years, and development expenditures may be credited against the minimum royalties due in the 6th through 10th years. In effect, the minimum royalties for the 6th through 10th years constitute an escalating development work requirement, while the minimum royalties for the 11th through 20th years are “water down the drain” unless production has been commenced. However, both the work requirement and the straight minimum royalty are fairly small compared to the costs required for actual development.

Minimum royalties are also required for coal leases, not as a primary lease condition but as a substitute, in the Secretary’s discretion, for the primary lease condition of continued operation of the mine.²⁵⁸ The Secretary has consistently issued coal leases permitting payment of minimum royalties in lieu of continued operation and, until recently, had nullified the minimum royalty requirement by, as in the case of the nonfuel leasable minerals, setting the minimum royalty equal to the annual rental. Beginning in 1973, however, the minimum royalty established for new leases has been based on a predetermined rate of production for the sixth and succeeding years of the lease,²⁵⁹ and an amendment to the law in 1976 explicitly requires that the minimum royalty on coal leases issued after August 3, 1976 “be no less than the production royalty which would otherwise be paid and . . . be computed on a fixed reserve to production ratio” determined by the Secretary.²⁶⁰ Current regulations issued by the Secretary of the Interior require payment of a minimum royalty beginning in the sixth year of a lease on an annual number of tons of coal sufficient to exhaust the leased reserves in 40 years from the date of issuance of the lease, if the lease was issued after May 28, 1976. Leases issued prior to 1976 but after 1973 contain a similar requirement. All leases issued prior to May 29, 1976 will be subject to a similar payment requirement beginning the year after their next readjustment, but no sooner than May 28, 1982. The production schedule underlying the required payments for such leases must be one that would be sufficient to exhaust the leased reserves within 40 years after May 29, 1976 if production had actually commenced on that date.²⁶¹

These minimum royalty requirements will not assure diligent development of coal leases. One calculation for a 241-acre lease issued after 1973 but prior to 1976 estimated minimum royalty payments of \$10,000 to \$20,000 a year,²⁶² still considerably less than the tens of millions of dollars required for actual development of a coal mine.²⁶³ Moreover, the minimum royalties for coal leases, unlike those for the nonfuel mineral leases discussed above, are advance royalties: they are credited against actual royalties due on future production and not just against actual royalties due in the same year.²⁶⁴ Hence, the coal advance royalties are not “water down the drain,” nor do

²⁵⁸30 U.S.C. § 207 (1976).

²⁵⁹See the GAO studies cited in notes 244 and 245: B-169124 at 24, RED-75-346 at 7-10, RED-76-79 at 20-21.

²⁶⁰30 U.S.C. § 207(b) (1976).

²⁶¹43 CFR §§ 3503.3-2(b)(1) & 3522.2-1(b) (1977)

²⁶²GAO Report RED-75-346, note 245, at 7-8.

²⁶³See ch. 2, subsec. D(4) and app. C, table C.3.

²⁶⁴30 U.S.C. § 207 (1976).

they result in double payments for future actual production. They are simply payments in advance of actual royalties due on future production. Nothing is lost by paying the advance royalty rather than producing the corresponding amount of coal: in either case the same sum has to be paid, and the sum so paid will count as actual royalty on the corresponding amount of coal whenever that coal is produced. 'b'

Thus, the advance royalty requirement for coal leases provides minimal incentive for speedier development or continuous operation by those who plan on producing coal eventually, and it provides only a slight incentive for surrender of leases by those who do not plan to produce but are rather speculating on profits from sale of their leases. The advance royalty requirement has been strengthened somewhat by Congress for coal leases issued after August 3, 1976. For such leases, advance royalties may be accepted in lieu of continued operation for no more than an aggregate of 10 years, and no advance royalty paid during the initial 20 years of a lease can be credited against royalties due on coal produced in the 21st or succeeding years.²⁶⁶ But these restrictions provide very little added incentive for diligent development.

E. Payments for Mineral Value

1. Placing Mineral Value Payments in Perspective

Almost invariably, one of the issues considered most important, if not the most important, in any debate on Federal mineral disposal policy is the issue of payments to the Government for the value of the minerals produced from Federal land by private parties. However, from the perspective of efficiency and fairness in the management of Federal land and its mineral and nonmineral resources, the issue of payments for mineral value is much less important than issues involving other types of payments that might be required—for example, payments for loss of or damage to nonmineral values caused by mineral activities, or payments designed to assure diligent mineral activity.

A particular mineral activity is efficient if and only if the value of the produced mineral is at least equal to the costs of exploring for, developing, and producing the mineral. The costs that must be considered include not only the direct costs in salaries and material of finding and producing a mineral deposit, but also the costs imposed on other activities and land uses as a result of the mineral activity. For example, a private farmowner will not undertake mineral activity on his own farm unless the gross income from the mineral activity is expected to cover not only the direct costs of that ac-

²⁶⁶ The assumption that the same sum will have to be paid is based on the requirement that the advance royalty be paid even if the continuous operation condition is satisfied. 43 CFR §§ 3503.3-2 (b) (1) & 3520.2-5(b) (1977). Otherwise, theoretically at least, continuous operation might be preferred to payment of advance royalty, since continuous operation requires production of an annual average amount (calculated over 3 years) of only 1 percent of the reserves of the logical mining unit of which the lease is a part (43 CFR § 3500.0-5 (g) (1977)), whereas advance royalties are paid annually on at least 2.5 percent of the reserves in the lease (recall the 40-year maximum payout schedule). The requirement that advance royalties be paid even if the continuous opera-

tion condition is satisfied seems valid for leases issued prior to Aug. 3, 1976, since the Secretary was authorized to require advance royalties in lieu of the continuous operation condition. 41 Stat. 439-440 (1920). However, the 1976 amendment of the law merely authorizes suspension of the condition of continued operation upon the payment of advance royalties; it does not explicitly authorize required advance royalties. 30 U.S.C. § 207(b) (1976). In actual practice, annual production will almost always exceed 2.5 percent of the lease reserves. Moreover, the Secretary has independent authority to insert provisions in leases to insure diligence. 30 U.S.C. §§ 187, 189 (1976).

²⁶⁷ 30 U.S.C. § 207(b) (Supp. I 1977).

tivity but also the net income from farming that will be lost as a result of the disturbance of the land by the mineral activity. And the farmer's mineral activity will not be efficient unless the gross income from mineral production is sufficient to cover not only his direct mineral costs plus his loss of farm income, but also any neighbor's loss in farm (or other) income due to, for example, destruction, interruption, or degradation of the common water supply. Otherwise, resources are being wasted: a higher net income would be achieved in the area without the mineral activity.

Not only efficiency, but also equity or fairness usually demands that costs imposed on others by a particular activity be paid by the party engaged in and profiting from that activity. Thus, payments by private parties engaged in mineral activities on Federal land for losses of or damage to nonmineral resources, on or off Federal land, caused by their activities are necessary for efficient and equitable resource use and land management.

Similarly, as was discussed in sections C and D, payments or "holding charges" may be required to assure diligent mineral activity and to free Federal mineral land for use by others when the current occupant is "sitting on" the land, although such payments must be structured very carefully to avoid wasteful, overly rapid, or otherwise inefficient mineral activities,

Payments for the value of the mineral itself, however, are not necessarily required to assure efficient and equitable Federal resource management. In fact, they may cause inefficiencies and inequities if they are not properly designed. It is both inefficient and inequitable to require a mineral explorer-producer to share with someone else that portion of the value of the mineral as produced and sold that represents the costs of finding, developing, and producing the mineral—that is, the value added to the mineral in the ground by the expenditures of the mineral explorer-producer rather than the value of the mineral deposit itself. Moreover, mineral activity will not occur unless the mineral explorer-producer is allowed to retain a minimum profit—at least equal to the net income that could have been made from some alternative investment—in addition to recovering his expenditures.

Any value of the mineral, as produced, in excess of the mineral explorer-producer's expenditures (including expenditures on unsuccessful exploration and development efforts) and minimum profit is the value of the mineral deposit in the ground, or "nature's bounty." The Federal Government, as owner of the land and, more importantly, as representative of the general public, has an equitable claim to a share in the bounty, particularly when the deposit was known or reasonably suspected to exist before any work was undertaken by the mineral explorer-producer. The Federal Government's claim is at least as strong as the claim of a speculator who acquired mineral tenure on a tract of Federal land and then sat on it until a genuine mineral explorer-producer came along and offered to purchase the tenure rights in order to actually explore and develop the tract. Although the Federal Government, and the public, might be willing to let a genuine mineral explorer-producer have all the bounty, they might not be willing to see the bounty pass (through the purchase price) to a speculator who has done nothing to explore or develop a tract.

Production will be initiated and will continue whether the mineral producer keeps the bounty or pays some or all of it to a speculator or the Government, since in each case, by hypothesis, there is no alternative investment that will provide a return to the producer larger than the minimum profit he is allowed to retain. However, efficiency may be affected in two ways. First, if the Government requires the producer to pay over all the bounty and allows him to retain only the minimum profit on expenditures, the producer will have no incentive to hold down those expenditures and perhaps even have a reverse incentive to increase or exaggerate them in order to obtain a larger gross return. Second, if the Government allows the producer to retain a share in the bounty plus his minimum return, which together exceed the normal return available on non-Federal (State and private) mineral properties, mineral explorers and producers theoretically will tend to concentrate their activities on Federal land as much as possible, all other things being equal. They will pass by equal or possibly even higher quality mineral deposits on non-Federal land, thereby causing unnecessary, excessive damage to nonmineral resources on Federal land, which generally contains higher quality non-mineral resources than non-Federal land.²⁶⁷

Thus, payments to the Government for the mineral value itself ideally should be structured to allow the mineral producer to obtain his minimum return on expenditures plus a percentage share of profits, if any, in excess of this minimum return, with some provision to ensure that the payments are not substantially lower than those normally required on non-Federal land.

Some people in the mineral industry contend that no payments for mineral value should be required as part of the mineral tenure arrangement, because mineral firms' profits are already taxed at the 48-percent corporate rate under the Federal income tax laws, which should be an adequate payment to the Government for its minerals. In practice, however, many mineral firms pay little or no Federal income tax each year, because of exemptions and deductions in the income tax laws, even when they are earning substantial net income.²⁶⁸ Moreover, firms with non-Federal landholdings make mineral value payments under their tenure agreements in addition to paying Federal taxes. As was noted immediately above, failure to require similar payments for Federal minerals may result in inefficiency if, as a result, mineral activity is skewed toward Federal land even when equally or more attractive mineral prospects are located on non-Federal land.

However, neither efficiency nor equity will be greatly affected, in most cases, if no payment at all by the mineral producer is required for the value of the mineral itself. On the other hand, both efficiency and equity can be severely undermined if no payments are required for losses of or damage to nonmineral resources resulting from mineral activities (see chapter 5) or if there are not sufficient incentives for diligent exploration and development (see sections C and D in this chapter). 'by

²⁶⁷ See ch. 5, especially sec. A and B.

²⁶⁸ See the annual corporate tax studies by U.S. Representative Charles A. Vanik (e.g., *Washington Post*, Oct. 3, 1976, at A24 and Jan. 28, 1978, at A1) and compare the net profits reported in, e.g., *Oil & Gas J.*, Aug. 8, 1977, at 28.

²⁶⁹ The prototype oil shale leases at least partially recognize the

lesser importance of the payments for mineral value by allowing 1) expenditures on diligent exploration and development to be credited against certain bonus and royalty payments (see subsec. D[3](c)) and 2) extraordinary expenditures on environmental protection to be credited against royalty payments. 38 F. R. 33189-33190 [1973] (sec. 5 and subsecs. 7(d), (e), & (f)).

It should also be noted that the issue of maximum revenue generation for the Federal Government or the general public is at present a false issue with respect to mineral value payments for the leasable minerals on onshore Federal land, since, as is discussed in subsection E(3) of chapter 6, 90 percent of the Federal onshore mineral leasing revenues are not retained by the Federal Government, but rather are required to be returned directly or indirectly to the Western States.

2. The Basic Types of Mineral Value Payments

There are many different types of mineral value payment requirements. Most of them, however, are simply combinations of one or more of the following basic payment requirements:

- Lump-sum front-end payment (fixed bonus)
- Lump-sum staggered payments (walkaway bonuses)
 - . Payments on gross value of production (royalties)
 - . Payments on net value of production (profit share)

The advantages and disadvantages of these basic payment requirements and their various combinations are discussed in detail elsewhere.²⁷⁰ Here only some of the principal advantages and disadvantages are summarized.

One of the principal goals of payments for mineral value has always been to obtain maximum revenue for the Government without distorting mineral decisions. As we saw in the previous subsection, this goal can be achieved if the mineral payments are structured to capture the “natural bounty” portion, and no more, of the gross value of the produced mineral—that is, the portion of the gross value of mineral production in excess of the amount required by the mineral explorer-producer to recover his exploration, development, and production costs plus a minimum profit.

Theoretically, the fixed-bonus payment requirement is ideally suited to capture the “natural bounty” for the Government. The bonus is merely set equal to the present value (the future flow of income discounted to the present time) of the expected bounty for a particular deposit. The bonus is paid in one or a few lump-sum payments at the beginning of the tenure period. The Government immediately receives its maximum revenue. The mineral explorer-producer treats the bonus, once paid, as a “sunk cost” and is free to explore, develop, and produce the mineral deposit in the most timely and efficient manner, free from any continuing “overhead” payments to the Government.

In practice, however, the fixed bonus approach can result in payment of much less than the full measure of a mineral deposit’s “natural bounty” and can discriminate against individual mineral explorers and the smaller mineral firms. The weaknesses of the fixed bonus stem from the considerable uncertainty surrounding mineral

²⁷⁰See, e.g., Lindahl and Useem, Congressional Research Service, Library of Congress, *Federal Leasing of Petroleum on the Outer Continental Shelf*, Senate Comm. on Int. & Ins. Affairs, 94th Cong., 2d sess. 33-41 (Comm. Print 1976); J. Whitaker, *Striking a Balance: Environment and Natural Resources Policy in the Nixon-Ford Years* 281-296 (1976); *The Exploration, Development and Pro-*

duction of Naval Petroleum Reserve No. 4, a report prepared for the Federal Energy Administration under Contract No. CR-05-60579-00, at 3-17 to 3-30, Exhibit 3-8 and B-11 to B-16 (1976); *Mineral Leasing as an Instrument of Public Policy* (M. Crommelin & A.R. Thompson eds. 1977).

prices, mineral exploitation costs, and the location, size, and quality of mineral deposits.

Even when the location, size, and quality of a particular mineral deposit are well known, a fixed bonus may capture much less than the deposit's full eventual bounty value if future mineral prices or mineral activity costs, or both, are uncertain. A prime example is the experience with competitive coal leasing prior to 1970, when hundreds of leases were issued for very small bonus payments or without any bonus payment at all, since there was no sizable market for Western coal (almost all Federal coal is in the West). In recent years, many of these same leases have become much more valuable due to increased demand for coal in general, and low-sulfur coal in particular, as well as a new demand for huge reserves of coal for projected new coal gasification and liquefaction technology.¹⁷ The Government will receive very little of the eventual bounty value realized on these leases. A similar situation could easily arise from overly rapid leasing of oil shale or geothermal steam deposits in advance of development of a widely applicable technology for commercial production of those minerals.

The problems are compounded when the location, size, and quality of mineral deposits are uncertain. Mineral explorers will reduce the size of the bonus they are willing to pay for a tract to match the probability of finding a deposit of the expected size and quality on the tract. For example, if there is only a 10-percent chance of finding a deposit with a bounty (return in excess of expenditures plus minimum profit) of \$100,000, they will pay at most \$10,000 for mineral rights on the tract. If no deposit is discovered, they are out \$10,000 and the Government has a "windfall" of \$10,000. If a deposit of the expected size and quality is discovered, they have obtained \$90,000 worth of the bounty and the Government has received only \$10,000 worth. Over a large number of tracts, however, the odds will balance out and the Government will receive in the aggregate close to the full bounty for each tract. Losses on some tracts will balance out gains on other tracts.

Large mineral firms, like the Government, often can balance gains against losses by spreading their risks across a large number of tracts. But individual explorers, small firms, and medium-sized firms often do not have sufficient capital to acquire and hold a large number of tracts. Even large firms can and occasionally do use up a large portion of their available risk capital on a single venture if they believe that they might discover an extremely valuable deposit. When a large part of an individual's or firm's risk capital is tied up in a single venture, failure of the venture can result in bankruptcy. Individuals and smaller firms, therefore, are viewed as worse risks than larger firms in the capital market. They have a harder time obtaining capital and pay a higher interest than the larger firms. Moreover, the individuals and smaller firms, and often even the larger firms, will be "risk averse" and add a risk aversion factor ("risk premium") to the perceived probability of failure in determining what bonus they are willing to pay to acquire a tract. For example, they will pay less than \$10,000 for a 10 percent probability of finding a deposit with a bounty of \$100,000.

The impact of uncertainty about the existence and nature of the deposit itself is thus twofold. First, the application of the "risk premium" results in the Government's

¹⁷ See the GAO studies cited in notes 244 and 245.

receiving less than the full bounty even over a large number of tracts, Second, individuals and smaller firms are at a serious disadvantage in competing for tracts, since they have less capital to spend on bonuses, must pay higher interest for the capital they obtain, and cannot easily spread their risks across a large number of tracts. The bonus approach discriminates against individuals and smaller firms and lessens competition, thus reducing even further the likelihood of the Government's receiving the full bounty value of a tract,²⁷²

Finally, the fixed-bonus payment approach forces the mineral explorer-producer to make large outlays initially on nonproductive payments rather than on actual exploration and development. When capital is tight, exploration and development will have to be postponed until the capital expended on bonuses is replenished from other sources,

Some of the problems of the fixed-bonus approach can be avoided by staggering the payment of the bonus over a considerable number of years, and allowing the mineral explorer-producer to "walk away" from installments yet to come due by surrendering his mineral tenure. This walkaway bonus can be structured in various ways—for example, as three different installments due at the acquisition of tenure, the beginning of development, and the beginning of production, respectively, or as an annual installment due indefinitely or due only until a certain total is reached.

The walkaway bonus reduces the amount of front-end money required and also reduces the risks associated with straight fixed bonuses, because the payments are spread out and need not be paid in full should the project be abandoned at an early stage—for example, during or after exploration. However, the walkaway bonus retains most of the disadvantages of the fixed bonus, although in milder form, and introduces some new problems of its own. It still requires substantial payments in advance of production and thus reduces the amount of capital available for exploration and development. It still gives an advantage to firms that have easier access to lower cost risk capital. It still can cause the Government to lose a large share of the bounty value because of risk premiums and uncertainty over future mineral prices and technology. And it can create new problems of wasteful, overly rapid, and prematurely terminated mineral activity, particularly if the payments are periodic (e. g., annual) and continue indefinitely rather than being limited in number and keyed to successful completion of certain stages in the mineral process. Rather than one "sunk cost" that does not affect mineral decisions, the walkaway bonus constitutes a series of payments, which are sunk costs once they are made but which can greatly influence mineral decisions while they loom as payments due in the future. If the payments are due at fixed intervals, mineral activity may be inefficiently speeded up to reduce the number of payments that will have to be paid. This practice can lead to wasteful mining, such as mining of only the highest grade ore, as well as loss of revenue to the Government. No matter how the payments are scheduled, tenure may be abandoned prematurely, even when

²⁷² Joint ventures, whereby individuals and smaller firms pool their capital to jointly bid on a tract, reduce the capital requirements and hence the risk for each joint venturer. But the comparative advantage of the larger firms will be preserved if they also form joint ventures. Moreover, joint ventures among the larger firms can substantially reduce competition and hence reduce the revenue received by the Government. For this reason, joint ven-

tures among larger firms have been banned for offshore oil and gas leasing, and a similar ban has been recommended for onshore coal and oil and gas leasing. U.S. Department of the Interior, *Joint Bidding for Federal Onshore Oil and Gas Lands, and Coal and Oil Shale Lands*, Ser. No. 94-40 (92-130), Senate Comm. on Int. & Ins. Affairs, 94th Cong., 2d sess. (Comm. Print 1976).

substantial mineral value exists, if the mineral value that could be recovered during the next tenure period is less than the payment due at the beginning of that period.

Royalty payments avoid the capital-related problems of bonuses by deferring all payments for mineral value until production is actually achieved, and then providing for payment out of the gross income received from the mineral production. Thus, no funds are diverted from mineral exploration and development, and individuals and smaller firms have a much better chance to compete for tracts. Moreover, the Government is assured of obtaining its desired share of any bounty value even if mineral prices should rise or if a much larger deposit than was expected should be developed, but only if a percentages-of-gross royalty is specified rather than a flat-charge-per-unit-of-production royalty (for example, 10 cents per ton of coal).

Unfortunately, since a royalty is an overhead charge that is added to actual operating costs for each unit of production, it can distort development and production decisions. If the royalty is set too high, it can prevent development of a mineral deposit or cause losses for an unwary firm, even though mineral development and production would be profitable in the absence of the royalty charge: the Government is taxing the portion of the value of mineral production attributable to development costs in addition to capturing 100 percent of the bounty portion of the value.

Even if the royalty is not set so high that it prevents starting up production, it may contribute to wasteful and prematurely terminated production. Almost all mineral deposits contain ore of varying thickness and quality. A royalty charge, no matter how small, will make it unprofitable to extract some portion of the lower grade ore that otherwise could have been extracted profitably. Thus, the royalty encourages ‘high-grading’ of mineral deposits while production is underway and premature termination of production when all the higher grade ore has been extracted. Mineral resources that could have been extracted are left in the ground and will probably never be extracted, given the high costs of recommencing production after it has been terminated. This is not only a waste of mineral resources but also causes more damage to nonmineral resources than would otherwise be incurred, since more deposits will have to be mined to obtain the desired quantity of mineral production. Even when the same mine is reopened, the surface will be disturbed twice rather than only once.

The adverse effects of royalties on efficient mineral production will be most pronounced when the royalty is used as the bidding variable in the competitive allocation of mineral tenure, since a bidder loses nothing by pushing the royalty level up extremely high: he can “high-grade” the deposit at whatever cutoff grade is necessary to assure profitable operations, or he can abandon the tract after only minimal exploration if the hoped-for higher grades of ore do not exist.

Premature abandonment can be delayed, if not entirely avoided, by provision for reductions in royalty as production or reserves decline. However, there will still be high-grading problems during production. Moreover, it is practically impossible to devise a declining royalty schedule that will reduce the royalty at precisely the right times. Premature reduction will result in loss of Government revenue. Delayed reduction will result in premature termination of production and consequently also in loss of Government revenue. If there is no provision for raising as well as reducing royalties,

the Government will lose revenue when production is significantly increased after a slack period. But royalties designed to slide up and down a scale depending on the rate of production will even further encourage high-grading and will discourage investment in techniques for boosting production through tapping of the lower grade portions of the deposit (e.g., secondary and tertiary recovery techniques for oil and gas deposits).

The theoretically most attractive payments for mineral value in a world of uncertainty are payments tied to the net rather than the gross value of production—a sort of net profit royalty usually described as a profit share. The profit share, like a normal royalty, avoids the potential for revenue loss and the bias against small firms inherent in bonus-payment requirements. And, since it is based on net profit rather than on the gross value or amount of production, it should not affect the efficiency of mineral operations; at least as long as the profit share is less than the bounty value of the mineral deposit.²⁷³

The major objection to profit-share payments is the practical problem of determining the actual net profit for a particular mineral project—in particular, the problem of determining the costs that should be subtracted from the gross income received from mineral production to arrive at net profit. A profit-share system would require uniform accounting procedures, including procedures for allocating company overhead to particular successful projects. This problem apparently has been considered sufficiently weighty to preclude any use of the profit-share payment system for Federal minerals. However, similar calculations have been required under the Federal income tax and State mineral taxation laws for quite some time. Furthermore, the Energy Policy and Conservation Act of 1975 explicitly requires the Securities and Exchange Commission to develop uniform accounting practices that must be followed by oil and gas producers, and the Department of Energy Organization Act requires that those practices also be followed, where applicable and to the extent practicable, in the annual financial reports required under the Act for any major firm engaged in exploitation of any fuel mineral.²⁷⁴ As part of the process of developing those practices, the Financial Accounting Standards Board initiated a project to develop uniform accounting practices for all extractive industries.²⁷⁵ Finally, lessees of some Federal minerals are already required to report exploration and development expenditures incurred to satisfy diligence requirements, and similar requirements exist for the locatable minerals.⁷⁶

3. Mineral Value Payments Under the Mining Law

There are no mineral value payments to the Government under the Mining Law. Payments of \$2.50 or \$5 per acre are required to obtain full fee title to placer and lode claims, respectively, but mineral production can proceed without obtaining a patent, and the nominal patent fees are not even sufficient to pay for the surface value of the land.²⁷⁷

²⁷³See subsec. E(1).

²⁷⁴15 U.S.C. § 796(c)(3), 42 U.S.C. §§ 6383, 7135(h) (1976 and Supp. I 1977); see *Oil & Gas J.*, July 25, 1977, at 107.

²⁷⁵Financial Accounting Standards Board, *Financial Accounting and Reporting in the Extractive Industries (Discussion Memorandum)*(1976).

⁷⁶See subsecs. D(2)(b) and D(3)(c).

²⁷⁷See U.S. General Accounting Office, *Modernization of 1872 Mining Law Needed to Encourage Domestic Mineral Production, Protect the Environment, and Improve Public Land Management*, B-118678, July 25, 1974, at 31-33.

Minerals that are produced free of charge under the Mining Law on Federal public domain are almost invariably subject to disposal only through payment of substantial bonuses or royalties on federally acquired land or State or private^{land.278} Other things being equal, the lack of any payment requirement under the Mining Law thus tends to skew mineral production toward the public domain with resultant losses in efficient use and management of the Nation's land and resources,²⁷⁹ in addition to depriving the Federal Government of the mineral revenue usually obtained by a mineral landowner,

4. Mineral Value Payments Under the Mineral Leasing Laws

The mineral leasing laws require royalty payments for each mineral leased.²⁸⁰ The regulations and lease form for hardrock minerals on acquired land also require royalty payments²⁸¹ For each mineral other than oil shale, native asphalt, and the tar sands, the royalties must be assessed on the gross value of the mineral production. The prototype oil shale leases require a fixed-charge-per-unit-of-production royalty, adjustable up and down as the value of the mineral fluctuates from year to year, although the law would seem to permit a net-profit royalty,²⁸²

Minimum royalty levels are established by law for surface-mined coal (12.5 percent),²⁸³ geothermal steam (10 percent), oil and gas (12.5 percent), phosphate (5 percent), potash (2 percent), sodium (2 percent), and sulfur (5 percent). Maximum royalty levels are established for preference-right sulfur leases (5 percent), noncompetitive oil and gas leases (12.5 percent), and competitive or noncompetitive geothermal steam leases (15 percent).²⁸⁴ The Secretary of the Interior has established a minimum royalty of 8 percent for underground-mined coal, unless conditions warrant a lower royalty.²⁸⁵ Royalties in actual leases are usually kept at or near the minimum levels, except for the sliding-scale royalties specified for competitive oil and gas leases.

The Secretary of the Interior has the authority to reduce the royalty on a lease, or any portion thereof segregated for royalty purposes, whenever in his judgment it is necessary to do so in order to promote development, or whenever in his judgment the lease otherwise cannot be successfully operated.²⁸⁶ However, it is difficult to judge when a reduction is justified in the absence of extensive data on production costs, which are usually not available and require considerable time to assemble and evaluate when made available. As a result, reductions in royalty are rare.

Competitive leases of onshore Federal mineral land have invariably been issued on the basis of the highest bonus bid, with a royalty fixed in advance of the competitive

²⁷⁸See, e.g., *PLLR: Nonfuel Legal Study*, note 8, app. 1.

²⁷⁹See subsec. E(1).

²⁸⁰30 U.S.C. §§ 207 (coal), 226(b) & (c) (oil and gas), 241(a) (oil shale, native asphalt, tar sands), 262 (sodium), 272 & 273 (sulfur), 282 & 283 (potassium), 1004(a) & 1007(b) (geothermal steam) (1976).

²⁸¹43 CFR § 3503.3-2(a)(1)(ii) (1977); BLM Lease Form 3520-6 (1972).

²⁸²38 F. R. 33189 (1973) (sec. 7).

²⁸³Prior to Aug. 4, 1976, the minimum royalty for coal, however mined, was 5 cents per ton, and fixed-cents-per-ton royalties continued to be specified in leases until 1971, when a switch to per-

centage-of-gross-value royalties (but not less than 5 cents per ton) was made administratively. See the GAO study cited in note 244, at 34-35.

²⁸⁴Geothermal steam royalties may be raised to a maximum of 22.5 percent through readjustment of the lease terms, but no such readjustment of the royalties may be made until at least 35 years after geothermal steam is first produced and every 20 years thereafter. Moreover, the royalty increase at each readjustment cannot exceed 50 percent of the royalty paid during the preceding period. 30 U.S.C. § 1007(b) (1976).

²⁸⁵43 CFR § 3503.3-3 (1977).

²⁸⁶30 U.S.C. §§ 209, 1012 (1976).

bidding, even though alternative methods of disposal are authorized for many of the leasable minerals.²⁸⁷ The bonus has always been a fixed rather than a walkaway bonus, except for the prototype oil-shale leases issued in 1974, which allow the lessee to forego payment of the last two of the five annual bonus installments if the lease is surrendered prior to the time the installments are due.²⁸⁸ The fixed bonus required for coal leases is spread across several years, but the entire bonus must be paid whether or not the lease is surrendered before all payments have come due.²⁸⁹

The advantages and disadvantages of bonuses and royalties are discussed in subsection E(2).

F. Maximum Mineral Recovery and Resource Conservation

1. Explicit and Implicit Impediments to Multiple Mineral Development

The existence of distinct legal provisions governing disposal of different minerals under the Federal mining and mineral leasing laws creates explicit and implicit impediments to multiple mineral development on any particular tract.

At one time, as was discussed in chapter 3, mineral leases could not be issued on land subject to a mining claim and vice versa. This legal impediment was removed for most situations by the Multiple Mineral Development Act of 1954.²⁹⁰ The Act, however, did not repeal the explicit provisions in the Mineral Leasing Act of 1920 that prohibit issuance of coal or phosphate prospecting permits for land already covered by a mining claim located under the Mining Law.²⁹¹ Moreover, the Act does not affect the prohibition against location of mining claims in situations where leasable and locatable minerals are intermingled in the same deposit, so that extraction of one type of mineral is impossible unless the other is also extracted.²⁹² A 1955 statute, no longer in force, was deemed necessary to allow concurrent extraction of intermixed coal and uranium deposits.”]

Even when concurrent operations under a mining claim and a mineral lease are legally permissible, they are rarely attempted due to the physical difficulty of having two distinct mining operations going on simultaneously on the same tract. Similarly, although mineral leases for different leasable minerals can be issued for the same tract, “[c] applications to lease a tract already under lease for another mineral are rarely filed; and the Bureau of Land Management, which issues mineral leases, is reluctant to approve applications that are filed, again due to the difficulty of coordinating two distinct mining operations on the same tract. When multiple mineral de-

²⁸⁷ See subsec. D(3)(a).

²⁸⁸ 38 F. R. 33189 (1973) (sec. 5).

²⁸⁹ The law requires that at least 50 percent of the acreage offered for lease each year be leased under a system of deferred bonus payment. 30 U.S.C. § 201(a) (1976). The Secretary of the Interior has issued regulations requiring that all coal leases be issued subject to a deferred bonus payment due in five equal installments over the first 4 years of the lease. 43 CFR § 3525.8(e) (1977).

²⁹⁰ See ch. 3, subsec. D(6).

²⁹¹ U.S. Department of the Interior, “The Effect of Mining Claims on Secretarial Authority to Issue Prospecting Permits for Coal and

Phosphate,” Solicitor’s Opinion M-36893, 84 I.D. 442 (1977).

²⁹² See, e.g., 30 U.S.C. § 1005(f) (1976).

²⁹³ See ch. 3, subsec. D(6).

²⁹⁴ It seems to be generally assumed that multiple leases can be issued, and the lease forms for the various leasable minerals reserve the right to issue multiple leases. However, Congress felt it was necessary to explicitly reserve the right to issue multiple leases in the statutory provisions authorizing leasing of native asphalt, tar sands, sulfur, and potassium. 30 U.S.C. §§ 241(c), 274, 284 (1976).

velopment by two distinct firms does occur, it almost always involves oil and gas leases, since oil and gas development requires no excavation and can be accomplished through directional drilling, thus providing the most space and flexibility for development of other minerals. But even with oil and gas leases, multiple development will be precluded if oil and gas operations would endanger mining operations, or vice versa.

Thus, either explicit legal restrictions or implicit physical restrictions will usually prevent multiple mineral development by two different firms on the same tract. Mineral explorers will usually bypass land that is already subject to a mining claim or a mineral lease, especially if it is actively being worked, unless they can buy out the claim or lease.

In practice, then, multiple mineral development is likely to occur only when it can be implemented by a single individual or firm, except in some situations where one of the minerals being developed is oil or gas. Unfortunately, however, there are also explicit and implicit impediments to single-firm multiple mineral development,

Even after passage of the Multiple Mineral Development Act, a mining claimant cannot extract leasable minerals from his claim unless the claim is patented and the patent does not contain a reservation to the Government of the leasable minerals. A reservation of the leasable minerals will be made if the land being patented is covered by a permit, lease, or application for a permit or lease under the mineral leasing laws, or is known to be valuable for a leasable mineral, at the time the patent is issued. Similarly, a mineral lessee cannot extract locatable (Mining Law) minerals, or even leasable minerals other than those covered by his lease, from the leased land.²⁹⁵

Holders of hardrock mineral leases on acquired land are allowed to mine the dominant hardrock mineral specified in the lease and also “associated minerals and any other hardrock minerals] in, upon, or under the [leased] lands.”²⁹⁶ Thus, hardrock mineral lessees on acquired land are treated the same as mining claimants on public domain. In either case, all hardrock minerals but none of the usual leasable minerals (geothermal steam, the fossil fuel minerals, phosphate, potassium, sodium and, in Louisiana and New Mexico only, sulfur) can be mined.

A holder of a coal, sulfur, oil shale, native asphalt, tar sand, or oil and gas lease is allowed to produce only that mineral for which the lease was issued. Holders of sodium leases are allowed to mine potassium compounds as a byproduct in addition to chlorides, sulphates, carbonates, borates, silicates, or nitrates of sodium.²⁹⁷ Conversely, potassium leases may include covenants providing for the development by the lessee of chlorides, sulphates, carbonates, borates, silicates, or nitrates not only of potassium but also of sodium, magnesium, aluminum, or calcium associated with the leased potassium deposits.²⁹⁸ The standard lease form for potassium contains no such covenants but does grant the exclusive right to mine and dispose of all the potassium “and associated deposits.”²⁹⁹ Holders of phosphate leases are allowed to mine phosphates and “associated or related minerals,” as well as “so much of any deposit of silica or limestone or any other . . . rock as may be utilized in the processing of the phosphates, phosphate rock, and associated or related minerals.”³⁰⁰

²⁹⁵ See ch. 3, subsec. D(6).

²⁹⁶ BLM Lease Form 3520-6 (1972).

²⁹⁷ 30 U.S.C. § 262 (1976).

²⁹⁸ *Ibid.*, § 284.

²⁹⁹ BLM Lease Form 3520-2 (1971).

³⁰⁰ 30 U.S.C. §§ 211(a), 213 (1976).

Holders of geothermal steam leases are allowed to produce geothermal steam and associated geothermal resources, including any byproduct minerals (exclusive of oil, hydrocarbon gas, and helium) that are found in solution or in association with geothermal steam and that have a value of less than 75 percent of the value of the geothermal steam or are not, because of quantity, quality, or technical difficulties in extraction and production, of sufficient value to warrant extraction and production by themselves.³⁰¹ In fact, if the production, use, or conversion of geothermal steam is susceptible of producing valuable byproducts, the Secretary of the Interior must require substantial beneficial production or use thereof unless, in individual circumstances, he modifies or waives this requirement in the interest of conservation of natural resources or for other reasons satisfactory to him.³⁰² The Secretary has issued regulations stating that one of the “other reasons satisfactory to him” is the economic unfeasibility of such beneficial production or use of byproducts.³⁰³

In sum, under the mineral leasing laws, most lessees may produce only the minerals for which their leases were issued. Sodium lessees may mine potassium compounds intermingled with the sodium. Potassium lessees may mine sodium compounds (ordinarily leasable under a different provision of the Leasing Act) and magnesium, aluminum, or calcium compounds (ordinarily locatable under the Mining Law) intermingled with the potassium. Geothermal lessees may (or must) produce any mineral other than oil, hydrocarbon gas, or helium intermingled with the geothermal steam. Phosphate lessees apparently may produce any mineral intermingled with the phosphate, as well as separate deposits of silica, limestone, or any other rock that can be used in processing operations. Hardrock lessees may produce any hardrock mineral, whether intermingled with or in a separate deposit from the dominant hardrock mineral for which the lease was issued. Mining claimants under the Mining Law may also produce any hardrock mineral found within the claim.

Thus, in no instance can a holder of a single mining claim or mineral lease produce all the valuable minerals that may occur within the claim or lease. Only a phosphate lessee can produce all the minerals intermingled with a deposit of the mineral for which a lease was issued or a claim was located. A mineral lessee, but not a mining claimant, can apply for additional mineral leases to obtain production rights for intermingled leasable minerals, but the costs (including multiple rentals and diligence requirements) and time required will often discourage such applications. Moreover, since the minerals for which the additional leases are sought are known to exist, competitive leasing may be required, although the original lessee would clearly have a substantial advantage in any competitive sale. Rights to nonintermingled minerals can be acquired through claim or lease, as appropriate, although again the costs and time required often may not be worth the effort.

When a mining claimant or mineral lessee is prevented by explicit limitations or costly multiple application requirements from producing all the minerals in his claim or lease, especially those minerals intermingled in the deposit being developed, there is an unnecessary loss in efficiency and most probably a waste of mineral resources, since it is unlikely in most cases that it will be economical for anyone to attempt to mine

³⁰¹30 U.S.C. §§ 1001(c) & (d), 1002 (1976).

³⁰²*Ibid.*, § 1008.

³⁰³43 CFR § 3242.1 (1977).

the unproduced minerals after the original claim or lease has terminated. In those cases where sequential production is possible, damage to surface resources and interruption of surface uses will be unnecessarily extended,

There seems to be little reason for not allowing [and possibly even requiring] production of all valuable minerals found within any mining claim or lease, as long as the appropriate royalties are paid on each mineral produced (a uniform profit-share perhaps could replace the different royalties). The paperwork and costs required for multiple applications by the same party are clearly unwarranted. And, as was discussed above, multiple mineral development by different parties on the same tract is highly unlikely even when it is allowed, and it is not allowed for intermingled locatable and leasable minerals.

If production of all valuable minerals is allowed, the period of the claim or lease should be extended as long as any mineral is being produced in commercial quantities (with provision for temporary interruptions of production), as is permitted for production of byproduct minerals under a geothermal steam lease.³⁰⁴

A more difficult issue is whether a mining claimant or mineral lessee should be allowed to obtain production rights if he finds any valuable mineral deposit, or rather must find a deposit that is valuable for the mineral for which the claim was located or the (permit or) lease was issued. Currently, production rights may be obtained under the mineral leasing laws only if a valuable deposit of the mineral for which the permit or lease was issued is found, even when concurrent production of other minerals is authorized. That is, the right to produce other minerals is dependent on first commencing production of the mineral for which the permit or lease was issued.³⁰⁵ Under the Mining Law, on the other hand, discovery of a valuable deposit of any hardrock mineral is sufficient, even if the mineral is not the one that was the object of the exploration effort.

If production rights could be obtained on discovery of any valuable mineral deposit, then each mining claim or mineral permit or lease in essence would become a comprehensive permit granting exclusive exploration rights for all minerals in a particular tract of land. The numerous distinct permits under the mineral leasing laws would no longer make sense, because if different permits were available the mineral explorer could choose to use whichever one seemed least burdensome. Similarly, the distinction between mining claims and mineral permits or leases would no longer make sense. Instead, there could be a single type of comprehensive claim, permit or lease (referred to, from now on, as a comprehensive permit) granting exclusive exploration, development, and production rights for all minerals in the land covered by the comprehensive permit.

Whether a comprehensive permit makes sense depends initially on whether uniform provisions can be devised to assure diligent exploration regardless of the minerals being searched for. (Uniform development and production provisions might also be desirable, but would not be necessary since the permit could specify or refer to different development and production provisions that would apply to different minerals or groups of minerals.] A comprehensive “permit” (mining claim) is now available for

³⁰⁴ 30 U.S.C. § 1005(e) (1976).

³⁰⁵ See subsec. D(3)(b).

hardrock minerals on public domain, with uniform assessment work requirements. Functionally similar diligence requirements are imposed on geothermal ^{Steam} leases. Although the requirements for hardrock minerals and geothermal steam are not now sufficient to assure diligent exploration, it appears that they could be made sufficient. ³⁰⁶ Any uniform requirements sufficient to assure diligent exploration for the hardrock minerals and geothermal steam would most likely be sufficient to assure diligent exploration for any mineral.

A second potential problem with a comprehensive permit is the grant of exclusive exploration rights for all minerals in a particular tract. A person exploring for one or a few minerals under a comprehensive permit would prevent others from exploring for different minerals in the same tract. This problem seems most troublesome in the context of current oil- and gas-leasing practices: several tens of millions of acres are being held for speculative purposes and are not believed to be worth drilling. ³⁰⁷ If these acres were held under a comprehensive permit system, exploration for other minerals would be needlessly and substantially limited. But the problem would not exist if adequate diligence requirements existed. Holdings of oil and gas leases would drop dramatically. And, as was noted above, mineral explorers even now will almost always bypass land that is already subject to a mining claim, mineral permit, or mineral lease that is actively being worked, unless they can buy out the claim, permit, or lease.

If, as seems to be the case, active multiple mineral exploration and development by different parties on the same tract is, in fact, highly unlikely because of explicit restrictions and practical difficulties, there would seem to be little reason to provide for issuance of multiple permits for the same tract. In practice if not theory, the single permit is already the rule. A comprehensive permit in such circumstances might provide a better incentive to explore in the first place (since any mineral discovered could be developed), to explore for all minerals, to utilize modern multiple mineral exploration technology, and to engage in multiple mineral mining, which would promote maximum mineral recovery and conservation of mineral and nonmineral resources.

2. Unitization and Cooperative Development Plans

Oil and gas occur in underground reservoirs. If, as is often the case, the same reservoir lies under several oil and gas leases held by different parties, the lessee who pumps the oil out fastest will obtain most of the resource. Timely and efficient mineral activity can give way to overly rapid exploration, development and production. Oil will not be conserved even though it might have a much higher value in the future. Furthermore, overly rapid production decreases the pressure in the reservoir so that ultimate total recovery may be reduced.

There have been two major approaches to resolution of this problem. One has been State laws and Federal lease provisions related to minimum spacing and maxi-

³⁰⁶See subsecs. C(2)(b) and C(3)(b). The expenditure requirement approach to diligent exploration may not be the best approach. It is referred to merely to indicate that a uniform approach for all minerals may be possible.

³⁰⁷See subsec. C(3)(b).

³⁰⁷See McDonald, "The Maximum Efficient Rate (MER) in Oil and Gas Production," in Resources for the Future *The Use of Maximum Efficient Rate (MER) as a Regulatory Tool*, Final Report to the U.S. Department of the Interior, at I-1, I-33 to I-39 (1976) (hereinafter cited as MER Study).

imum rates of production of wells.³⁰⁹ The other has been the adoption of cooperative or unit plans, communitization or drilling agreements, or operating, drilling, or development contracts for joint development and production of all or part of a reservoir.

The Secretary of the Interior is authorized to approve participation by Federal lessees in cooperative or unit plans and, with the consent of the lessees, to establish, alter, change, or revoke drilling, producing, rental, minimum royalty, and royalty requirements of such leases. The plan may provide for control of the rate of prospecting and development and the quantity and rate of production. The Secretary may insert in every new Federal oil and gas lease a provision requiring the lessee to operate under a reasonable cooperative or unit plan, and he may prescribe a plan under which the lessee shall operate.³¹⁰ The Federal oil and gas lease forms contain such a provision. The Secretary may also approve participation by Federal oil and gas lessees in communitization or drilling agreements or operating, drilling, or development contracts.³¹² Any Federal oil and gas lease included in a cooperative or unit plan or an operating, drilling, or development contract is not counted in determining acreage holdings, and operations or production under a cooperative or unit plan or a communitization or drilling agreement are deemed to occur on each lease committed thereto for purposes of diligence and tenure requirements.³¹³

Almost identical provisions apply to geothermal steam leases.³¹⁴

The Secretary, by regulation, has provided for approval of operating or development contracts, or processing or milling arrangements, made by one or more Federal lessees of hardrock minerals on acquired land to justify operations on a large scale for the discovery, development, production, or transportation of ores.³¹⁵ Apparently, however, individual lease terms and conditions remain applicable.

Since 1976, the Secretary has been authorized to approve consolidation of Federal coal leases, including intervening or adjacent non-Federal coal land, into logical mining units, and he may require a lessee of a Federal coal lease issued on or after August 4, 1976, to form a logical mining unit. A logical mining unit is defined as an area of land in which the coal resources can be developed in an efficient, economical, and orderly manner as a unit with due regard to conservation of coal reserves and other resources. A logical mining unit cannot exceed 25,000 acres, including Federal and non-Federal acreage, and Federal leases included in a logical mining unit are not exempted from the limitations on total acreage holdings.³¹⁶

The Secretary may amend the provisions of any Federal coal lease included within a logical mining unit to conform to the requirements imposed on the unit. He may further provide that operations or production on any part of the logical mining unit shall be deemed to occur on all Federal leases in the unit for purposes of diligence and tenure requirements, and he may allow rental, royalty, and advance royalty payments to be combined for the unit.”;

³⁰⁹See, e.g., 30 CFR §§ 221.10, 221.15, 221.21, 221.35 (1977); BLM Lease Form 3110-1, § 4 (1977).

³¹⁰30 U.S.C. § 226(j) (1976).

³¹¹See, e.g., BLM Lease Form 3110-1, § 2(b) (1977).

³¹²30 U.S.C. § 226(j) (1976).

³¹³Ibid.

³¹⁴30 U.S.C. §§ 1005(c), 1017 (1976).

³¹⁵43 CFR § 3505.3 (1977).

³¹⁶30 U.S.C. § 202a (1976).

³¹⁷Ibid.

All of these unitization or cooperative development provisions are intended to prevent waste and assure efficient mineral operations by allowing or requiring mineral deposits to be explored, developed, and produced as a unit rather than in fragmented chunks under separate Federal, State, or private leases owned by different parties. They remove many barriers to maximum mineral recovery and resource conservation, but they may themselves be subject to requirements, including payment and diligence requirements, which detract from maximum mineral recovery and resource conservation.

3. Effect of Mineral Value Payment Requirements

The adverse effect of royalties and walkaway bonuses on maximum mineral recovery and resource conservation is discussed in detail in subsection E(2). Both types of payment requirements can cause mining of only the higher grade ore while production is underway and premature termination of production when all the higher grade ore has been mined. Mineral resources that could have been profitably extracted in the absence of the payment requirements are left in the ground and will probably never be produced, given the high costs of resuming production once it has been terminated. This is not only a waste of mineral resources but also causes more damage to nonmineral resources than would otherwise be incurred, since more mineral deposits will have to be mined to obtain the desired quantity of mineral production. Even when the same mine is reopened, the surface will be disturbed twice rather than only once.

All onshore Federal leases require payment of royalties to the Government. The adverse effects of royalties described above could be avoided by a shift to alternative types of mineral value payment requirements, such as the profit share.³¹⁸

Unfortunately, royalty payment requirements are imposed on Federal lessees not only in the lease itself, but also by previous holders of the lease who assigned their rights to the current leaseholder but retained an "overriding royalty." This is a particularly troublesome problem with oil and gas leases because of the uncontrolled speculation in noncompetitive leases.³¹⁹

The Secretary of the Interior has restricted the use of overriding royalties through regulations and lease provisions. For example, the oil and gas lease forms limit overriding royalties to a maximum of 5 percent except as otherwise authorized by the regulations. The regulations prohibit any overriding royalty on oil (but not gas) that, when added to previously existing overriding royalties and the basic lease royalty, would result in an aggregate royalty obligation in excess of 17.5 percent, unless the agreement creating the excess royalty expressly provides that the obligation to pay such excess overriding royalty will be suspended when average daily production per well is 15 barrels or less.³²⁰ Similar restrictions exist for all the other leasable minerals. Overriding royalties on hardrock, sodium, sulfur, or potassium leases are subject to reduction, in inverse order of creation, to an aggregate of not less than 1 percent, whenever such reduction appears necessary to prevent premature abandonment or to make possible

³¹⁸See subsecs. E(2) and E(3).

³¹⁹See *GAO Acreage Limitations Study*, note 55, at 13-14, 19-20.

³²⁰43 CFR § 3103.3-6 (1977); BLM Lease Forms 3110-3 (1973), 3120-3 (1968) & 3120-7 (1977).

the economic mining of marginal or low-grade deposits.³²¹ Overriding royalties on coal or phosphate leases³²² or the prototype oil shale leases³²³ cannot exceed, in the aggregate, 1 percent for coal, 50 percent of the basic lease royalty for phosphate, or 25 percent of the basic lease royalty for oil shale, unless in each case the assignor shows that he has made substantial investments for improvements on the land covered by the assignment. Overriding royalties on geothermal steam leases cannot exceed, in the aggregate, 50 percent of the basic lease royalty.³²⁴

As was discussed in subsection E(3) above, the Secretary can [but rarely does) reduce the basic lease royalty whenever in his judgment it is necessary to do so in order to promote development, or whenever in his judgment the lease otherwise cannot be successfully operated. The regulations provide that no such reduction will be authorized unless the holders of overriding royalties agree to reduce them to an aggregate not exceeding 50 percent of the reduced basic lease royalty.³²⁵

The restrictions on overriding royalties listed above are generally quite weak. Most of the restrictions require affirmative Government action, which is rarely forthcoming, before any actual limitation of overriding royalties is imposed. The limitations, when imposed, still permit substantial overriding royalties for oil, phosphate, oil shale, and geothermal steam. There is no aggregate limit on overriding royalties for natural gas.

Considering the substantial adverse effects royalties can have on maximum mineral recovery and resource conservation, a strong argument can be made for banning any reservation of overriding royalties by assignors who have not made substantial good faith expenditures for exploration, development, or production of the assigned land: the speculator who has done nothing to develop the land should not be allowed to burden its future development, but rather should be left to recover his speculative profits through fixed-bonus or profit-share payments.

In these days of concern over the availability and conservation of mineral resources, consideration could also be given to prohibiting retention of overriding royalties even by an assignor who has expended substantial time and effort on developing the assigned land. If his work has been productive, there will probably be sufficient information about the mineral deposit to enable him to capture his fair share of future profits through a fixed-bonus payment. Or, if there is still considerable uncertainty about the value of the tract, a profit share could be negotiated.

State severance, property, and license taxes based on gross income are in effect royalties on production, and have the adverse effects associated with royalties. The State taxes are discussed more fully in chapter 6, subsection E(1).

4. Effect of Performance Requirements and Incentives

Performance requirements and incentives are imposed on mineral tenure holders to prevent them from “sitting” on land and precluding mineral and nonmineral activ-

³²¹ 43 CFR § 3503.3-2(c) [1977].

³²² *Ibid.*

³²³ 38 F. R. 33193 [1973] [sec. 25].

³²⁴ 43 CFR § 3241.7-2 [1977].

³²⁵ 43 CFR §§ 3103.3-7, 3205.3-7, 3503.3-2(d) [1977]. There does not appear to be such an express requirement for oil shale leases.

ities by others, or to correct practices that are wasteful from the standpoint of the Nation as a whole even though such practices may be “efficient” from the standpoint of the individual tenure holder,

Inadequate diligence requirements or incentives allow mineral land to be tied up by speculators, insufficiently financed explorers or developers, or producers with an overabundance of reserves, who can exclude someone willing and able to undertake immediate exploration or development, or who can demand royalties or other payments in return for the transfer of tenure rights, thereby reducing the interest in such transfer or, should the transfer occur, burdening future mineral operations,³²⁶ even though the original tenure holder may have done little or nothing to explore or develop the land.

Furthermore, the uncertainty over whether or when mineral activity will occur, coupled with the preferred position given to mineral activities, discourages nonmineral development on or near a tract subject to mineral tenure rights. It prevents all but the shortest term planning of land use and services for the tract itself and the surrounding area.³²⁷

The performance requirements and incentives under the Federal mining and mineral leasing laws are discussed in sections C and D. These requirements and incentives are inadequate to assure diligent exploration and development for all or almost all of the minerals. In addition, some of the requirements, such as the Federal and State location, discovery, and work requirements under the Mining Law, result in make-work, which often destroys nonmineral values without making any contribution to the discovery or development of mineral deposits.³²⁸

On the other hand, overly stringent production requirements, such as those requiring a certain rate or continuity of production, can prevent conservation of mineral resources that would have a greater value to the Nation in the future but are required to be produced now, or can force premature abandonment or forfeiture of the mineral tenure if the required production cannot be sold at a minimum profit. Similarly, if the time allowed for production is too brief to allow complete mining of the deposit, mining of only the higher grade ores will be encouraged, causing the same adverse effects on maximum mineral recovery and mineral and nonmineral resource conservation as is caused by royalties on the gross amount or value of production.³²⁹

Such production requirements exist for most of the leasable minerals after the primary period of the lease has expired. The fuel mineral leases are continued after their primary period only so long as there is annual production, unless the Secretary of the Interior suspends operations in the interest of conservation (a rare occurrence). Certain other leasable minerals have an assured lease period of only 20 years, since there is only a preferential right to renew the lease after the initial 20-year lease period.³³⁰

Even more extensive intrusions into the timing and rate of production are authorized but have not yet been implemented for federally leased oil and gas. The Energy

³²⁶See subsec. F(3).

³²⁷See ch. 5, subsecs. D(8) and E(7).

³²⁸Ibid., subsec. D(2).

³²⁹See subsec. F(3).

³³⁰See table 4.2 and the following pages in subsec. D(3)(c).

Policy and Conservation Act of 1975 directs the Secretary of the Interior³³¹ to determine the maximum efficient rate of production (MER)—which is defined as “the maximum rate of production . . . which may be sustained without loss of ultimate recovery . . . under sound engineering and economic principles” —for each oil field or gas field on Federal land that produces, or is capable of producing, significant volumes of crude oil, natural gas, or both,³³² The Act also authorizes the President to require production from Federal land at the MER.

Historically, the MER concept has been used, as the word “maximum” in “maximum economic recovery” would suggest, as a ceiling on production rates to prevent waste of oil and gas caused by overly rapid pumping of the reservoir. The MER concept and similar schemes were and are necessary to correct mineral production practices that are wasteful from the standpoint of the Nation as a whole even though such practices may be “efficient” from the standpoint of the individual oil producer,³³³ However, the use of the MER not simply as a ceiling on permissible production rates, but rather as the required rate of production, raises substantial logical, practical, and efficiency problems.³³⁴

When MER is used merely as a ceiling, it is a requirement imposed to assure achievement of maximum ultimate recovery. It corrects for a deficiency in the market caused by the common-pool problem of different leases on the same oil or gas reservoir. It is not concerned with the timing or continuity of production, nor is it concerned with the quantity, if any, produced at any particular time as long as the quantity is below the allowable ceiling. It leaves those decisions to the lessee and the market. Thus, it should result in the most efficient (least wasteful) production over time given adequate competition.

MER has been applied almost exclusively to oil and gas. However, in recent years both the Congress and the Department of the Interior have taken the maximum ultimate recovery goal underlying MER, broadened it to encompass maximum economic multimineral recovery and conservation of the full range of mineral and nonmineral resources, and applied it in various ways to development and production under all mineral leases.

For example, the operating regulations for all mineral leases other than coal, geothermal steam, oil and gas, or in situ oil shale leases require that:

Mining operations shall be conducted in a manner to yield the ultimate maximum recovery of the mineral deposits, consistent with the protection and use of other natural resources and the protection and preservation of the environment—land, water, and air.³³⁵

However, the regulatory requirement of maximum recovery of the mineral deposits (not just the leased mineral) is significantly undermined by the explicit and implicit impediments to multiple mineral development created by the existing patchwork system of Federal mineral laws.³³⁶

³³¹ The responsibility for establishing the production rates was transferred to the Secretary of Energy in 1977. See ch. 6, subsec. A(2).

³³² 42 U.S.C. § 6214 (1976).

³³³ See subsec. F(2).

³³⁴ See MER Study, note 308; Bruce, “‘Maximum Efficient Rate’—Its Use and Misuse in Production Regulation,” 9 Nat. Res. L. 441 (1976).

³³⁵ 30 CFR § 231.31(a) (1977); see *ibid.*, § 231.1(b).

³³⁶ See subsec. F(1).

The Geothermal Steam Act of 1970 and the regulations implementing it are packed with provisions designed to assure maximum mineral recovery and conservation of mineral and nonmineral resources, including a statutory provision not only allowing but also requiring substantial beneficial production or use of all valuable minerals found in solution or association with geothermal steam and susceptible of being produced along with the production, use, or conversion of the geothermal steam, unless the Secretary of the Interior modifies or waives this requirement in a particular case in the interest of conservation of natural resources or for other reasons satisfactory to him. The only "other reason" specifically mentioned in the regulations is the economic infeasibility (not just reduced profit) of such beneficial production or use of byproducts.³³⁷

Meanwhile, both economic and environmental components have found their way into actual or proposed definitions of MER for oil and gas leases,³³⁸

The most recent congressional revision of the Federal mineral leasing laws, the Federal Coal Leasing Amendments Act adopted in 1976, forbids approval of a coal mining operating plan for a Federal lease unless the plan is found to achieve the maximum economic recovery of the coal within the tract.³³⁹ The committee report on the bill that became law explained the meaning of and motivation for the maximum economic recovery requirement as follows:

A primary concern of any future coal leasing program on public lands should be the maximum economic recovery of the available coal resources. At present, easily reached surface deposits which yield the highest profits are often the only resources developed in an area that contains vast amounts of coal not so easily or profitably extracted. This results in the waste of valuable resources, and the creation of severe environmental impacts, [The bill] seeks to prevent such waste by requiring the Secretary to form leasing tracts which "permit the mining of all coal which can be economically extracted." In addition, the Secretary is prohibited from approving any mining plan which he finds does not achieve the maximum economic recovery of the coal within the tract.³⁴⁰

The Act further specifies that, prior to issuance of any coal lease, the Secretary must prepare a written evaluation and comparison of the effects (including, but not limited to, impacts on the environment, agricultural and other economic activities, and public services) of recovering coal by deep mining, by surface mining, and by any other method to determine which method or methods or sequence of methods achieve the maximum economic recovery of the coal within the lease,

The committee report also stated that the Secretary's concept of a "logical mining unit" was adopted to "further enable the maximum economic recovery from coal deposits."³⁴¹ Under the Act, the Secretary may approve consolidation of coal leases into a logical mining unit only upon determining that "maximum economic recovery of the coal deposit or deposits is served thereby," A logical mining unit is defined as "an area of land in which the coal resources can be developed in an efficient, economical, and

³³⁷ Ibid.

³³⁸ 42 F. R. 3904, 10744 (1977); MER Study, note 308. Technically, "economic" includes "environmental," but the two are often distinguished in general discussions, as they are in one of

the definitions.

³³⁹ 30 U.S.C. § 201(a)(3)(C) (1976).

³⁴⁰ H.R. Rep. No. 94-681, 94th Cong., 1st sess. 20 (1975).

³⁴¹ Ibid.

orderly manner as a unit with due regard to conservation of coal reserves and other resources.³⁴²

Clearly, the maximum economic recovery requirement was designed to conserve mineral and nonmineral resources by restricting, insofar as possible, the practice of mining only the more accessible or higher grade coal seams on Federal land. The implementing regulations for surface coal mines require extraction of the coal resource to the maximum extent possible so that future environmental disturbance caused by the resumption of mining (or having to open an entirely new mine elsewhere) will be minimized.³⁴³ Apparently, however, the maximum economic recovery requirement is not being enforced; mining plans are being approved that do not include all the recoverable coal in a lease.³⁴⁴

G. Summary and Options

This section summarizes the material discussed in the previous sections of this chapter by presenting four major options for consideration. The options are presented in ascending degree of the amount and character of change involved when compared with the existing systems—no changes at all, moderate adjustments to the existing systems, major adjustments to the existing systems, and a comprehensive new system (for all minerals or for the nonfuel minerals only) to replace the existing distinct systems. The options, other than the “no change” option, are presented in skeletal form in table 1 at the end of the executive summary.

In each option other than the “no change” option, an attempt is made to eliminate unnecessary or duplicative regulations, to address questions of efficiency and equity in other regulations, and, where it seems appropriate, to replace regulatory restrictions with more flexible payment requirements or incentives. Many of the elements discussed under these four options are controversial; some are highly controversial. This report has not examined in depth the entire range of impacts that would be expected from the implementation of the options presented below.

Option 1. The Existing Systems (“No Change” Option)

The existing laws that govern mineral activities on Federal onshore land were enacted over more than a century. Different provisions within the same law or in different laws were enacted for land in different States, for land acquired by different methods, for different minerals, or for different geologic configurations of the same mineral. The resulting collection of laws contains significant gaps in coverage, treats physically similar lands or mineral deposits differently, and otherwise makes distinctions that often seem arbitrary or are difficult to apply.

³⁴²30 U.S.C. § 202a (1976).

³⁴³43 CFR § 3041.2-2(c) (1977), apparently based on Surface Mining Control and Reclamation Act of 1977, § 515(b)(1), 30 U.S.C. § 1265 (b)(1) (Supp. 1 1977). The regulation for *underground* coal mines is very similar to the maximum recovery regulation for most of the leasable minerals quoted in the text at note 335, except for

the insertion of a “sound economic practice” limitation on the maximum recovery requirement for *underground* coal. 30 CFR § 211.30 (1977).

³⁴⁴U.S. General Accounting Office, *Inaccurate Estimates of Western Coal Reserves Should Be Corrected*, EMD-78-32, July 11, 1978, at iii, 12-15, 22-23, 28, 41.

The patchwork of existing mineral laws creates legal and practical barriers to multiple-mineral exploration and development on the same tract of Federal land. It also creates considerable uncertainty about the procedures to be followed to find and develop the growing number of mineral resources, such as zeolites, that cannot easily be classified as being subject to one law or another.

Tenure for mineral activities is uncertain and insecure under each of the existing laws. Under the Mining Law, there is no way to obtain exploration rights secure against the Government even after particular targets have been staked, and the *pedis possessio* doctrine provides only very weak protection against other mineral explorers. Under the leasing and sale laws, exploration rights valid against other mineral explorers and the Government can be obtained, but the granting of such rights is at the complete discretion of the Secretary of the Interior. Development and production rights for all minerals under the Mining Law and for nonfuel minerals under the leasing laws depend on satisfaction of the shifting and uncertain “discovery of a valuable mineral deposit” test.

On the other hand, the existing laws provide very few effective requirements or incentives for diligent exploration, development, or production once mineral rights have been acquired. Speculators or inadequately financed explorers or developers can tie up promising mineral land for many years, often indefinitely, or can burden future mineral activity by retaining overriding royalties although they have done nothing to develop the land. It is difficult, if not impossible, to prove noncompliance with such work requirements as do exist, and the Government may not be able to cancel mineral rights even when noncompliance has been proved. Many of the claim location and work requirements imposed by the Federal and State governments under the Mining Law do not promote the identification and development of economic mineral deposits, but rather result in needless damage to the land and expense to the explorer or developer. However, some States have recently changed their discovery work requirements to reduce such needless damage and expense.

The maximum acreage limits on individual mining claims or mineral leases are, in some cases, insufficient for modern mineral projects and techniques. These limits can prevent formation of economic mining units for competitive leasing and can cause unnecessary and unproductive work when the work requirements specified for each claim or lease cannot be aggregated for contiguous claims or leases. Minimum acreage limits either do not exist or are not set high enough to prevent splintering of economic mining units by speculators, making it more difficult to assemble such units, administer the laws, and reduce the anticonservation effect of overriding royalties.

Expense and uncertainty exist under the leasing laws as a result of the blurred distinctions between known and unknown mineral areas. Competitive bonus bidding for known mineral areas places individuals and smaller firms at a disadvantage. Gross royalties inserted in leases for known and unknown mineral areas can result in failure to produce lower grade minerals that otherwise could be efficiently recovered.

Finally, the Mining Law has some outmoded provisions (such as the provisions for extralateral rights and tunnel sites and the distinctions among lode and placer claims

and millsites) that create problems for the mineral industry without serving any useful purpose.

Option 2. Moderate Adjustments to the Existing Distinct Systems

Moderate adjustments could be made to some of the existing distinct systems that would eliminate or reduce a good part of the inefficiency and uncertainty that now exist. These adjustments would be “moderate” in the sense that they would not alter the basic character of any existing system. Consequently, they would not affect aspects of a system that are a key part of its structure, nor would they eliminate the gaps and uncertainties that arise from the existence of a number of distinct systems.

For example, the tunnel site, lode versus placer, and extralateral right provisions in the Mining Law could be eliminated. Maximum limits on the size of individual claims under the Mining Law could be replaced with much larger maximum limits on the area that could be treated as a unit for the purpose of satisfying work requirements. Damaging and unproductive claim marking and location requirements could be replaced with filings in the local land office, as is currently the practice under the leasing laws. The existing annual work requirements could be increased slightly each year a claim is held, and work performed in excess of the requirement for one year could be “banked” and applied toward requirements in subsequent years. Payments could be allowed in lieu of actual work. Failure to file proof of such work or make payment every year would result in automatic cancellation of the claim. If it is desired to require payments to the Federal Government for production of minerals under the Mining Law, then the payments probably should be structured as a share of net profits (gross income less expenses and a minimum return on investment) in order to avoid inefficiencies that may result from other types of mineral value payment requirements. It should be noted, however, that payments for mineral value are much less important, from the standpoint of either efficiency or equity, than payments in lieu of work requirements or payments for damage to nonmineral resources.

Similarly, maximum acreage limits could be eliminated from the leasing laws. An escalating, payable, bankable work requirement could be introduced similar to the one outlined above for the Mining Law and already in effect for oil shale and geothermal steam leases. Gross royalties could be replaced by profit-share payments,

Minimum sizes could be specified for claims and leases, and overriding royalties could be eliminated, severely limited, or required to be based on net profits rather than on gross income.

Claims and leases could be terminated automatically after 15 to 20 years if development had not yet been completed—that is, unless there were a well or mine producing or capable of producing. The escalating, payable, bankable work requirement could be replaced, after development had been completed, by a requirement of annual commercial volume production, or payment of an advance royalty on such production in lieu of actual production. The Secretary of the Interior could be authorized to suspend any work or production requirement for good cause shown in a particular case,

but might not be allowed to extend the 15- to 20-year period allowed for completion of development.

These adjustments could greatly improve the efficiency of mineral activities. However, substantial problems would remain. For example, the work requirements, although improved, would still be insufficient to ensure diligent mineral activity, and tenure for exploration, development, and production, especially for the nonfuel minerals, would continue to be uncertain and insecure.

Option 3. Major Adjustments to the Existing Distinct Systems

Further adjustments, in addition to those outlined in the previous “moderate adjustments” option, would be necessary to provide for secure tenure and diligent activity under the mining and mineral leasing laws. These adjustments would eliminate or revise major elements of each separate system. However, they would still not eliminate the gaps and uncertainties created by the existence of a number of distinct systems.

Secure exploration rights could be created under the Mining Law by granting to each claimant an exclusive right to explore, good against the Government as well as against other explorers, for a 2-year period, perhaps renewable for an additional 2 years for good cause shown. In addition, the “discovery of a valuable mineral deposit” test for acquiring and maintaining development and production tenure could be eliminated. Any explorer willing and able to begin substantial development activity upon termination of the exploration period would automatically be granted tenure for development and production. Alternatively, development and production tenure could be granted initially along with the exploration tenure, subject to the condition that exploration be completed within 2 (perhaps extendable to 4) years. Either way, the tenure package would be subject to the work requirements and time limits on development, and the produce-or-pay conditions on production, outlined above in the “moderate adjustments” option. Moreover, to prevent speculation in and tying up of mineral land, the escalating annual work requirements would be applied to exploration as well as development and increased to a level comparable to actual expenditures on good faith exploration and development. (The annual work requirements could be either uniform requirements revised periodically on the basis of reported expenditures on actual projects, or ad hoc negotiated requirements built into a “development contract.”)

Patents (ownership documents) would continue to be granted under the Mining Law, but only after commencement of development. To prevent abuse of the liberalized tenure provisions, a patent would grant ownership of the minerals only, not the surface. Use of the surface, for mining-related purposes only, could be allowed upon payment of an appropriate rental. The mineral ownership would revert to the Government if the annual work or production requirements were not satisfied or if the surface were used for nonmineral purposes,

Similar adjustments could be made under the leasing laws. The “discovery of a valuable mineral deposit” test for acquiring development and production tenure for nonfuel minerals under the leasing laws could be replaced by automatic grants of such tenure, as outlined immediately above for the Mining Law, and subject to the same

work requirements, time limits, and conditions. These work requirements, time limits, and conditions could also replace similar but less effective provisions currently applicable to the tenure granted for exploration, development, and production of the fuel minerals under the leasing laws. Again, the escalating work requirements would have to be increased to a level comparable to actual expenditures on good faith exploration and development in order to avoid speculation in and tying up of mineral land.

Finally, the distinction between known and unknown mineral areas could be eliminated from the leasing laws and avoided under the Mining Law, since (a) profit-share mineral value payments should satisfy those who believe that the Government should receive payment for its mineral resources, (b) the substantial escalating work requirements should deter speculation, and (c) the elimination or restriction of overriding royalties should also deter speculation and minimize burdens on production resulting from such speculation. Competitive bidding or a lottery are two options that could be reserved for those situations where more than one person filed a claim or applied for a lease for the same tract of land during, for example, any 10-day period.

As is discussed below and in section H of chapter 5, several of these major adjustments would eliminate some of the strongest protections of nonmineral values that now exist under the mining and mineral leasing laws (e. g., the “discovery of a valuable mineral deposit” test for acquiring development and production tenure under the mining and mineral leasing laws and the ability to withdraw claimed land from continued exploration under the Mining Law). Therefore, it is doubtful that these adjustments could be made without also making other changes to ensure proper balancing of mineral and nonmineral resource values.

Option 4a. Replacement of the Existing Distinct Systems With a Comprehensive System for All Minerals

If all the moderate and major adjustments listed above were made to the existing distinct systems, the various systems would be practically identical in structure, requirements, and effects, and there would be little reason for continuing the distinctions among minerals and lands covered by the systems.

Thus, the confusion and costs involved in applying the lines that separate the systems, and the impediments to efficient multiple-mineral operations inherent in such line-drawing, could be eliminated by combining all minerals and lands under one comprehensive system (either location, leasing, or some other system). A claim or lease under this comprehensive system would grant exclusive rights for all minerals.

The major remaining obstacle to such a comprehensive system would be the theoretical distinction between a miner’s absolute right of access under the Mining Law and his access subject to the discretion of the Secretary of the Interior under the leasing and sale laws. But the “*absolute” right of access under the Mining Law can be and increasingly has been blocked or restricted through land withdrawals or through delays or restrictions on rights-of-way or other land use permits. Withdrawals can now be made at any point during exploration under the Mining Law, so that exploration access and tenure are even more uncertain under the Mining Law than they are

under the leasing and sale laws. One of the major adjustments to the Mining Law listed above would provide for exploration tenure secure against such land withdrawals. But it is doubtful that such an adjustment could be made without eliminating the absolute right of access, unless better provisions for coordinating mineral and nonmineral activities were also adopted. If such better provisions were available, they could be applied also to the leasing and sale laws in order to reduce the need for Secretarial discretion over access under those laws.

In sum, the need (or lack of need) for Secretarial discretion over access is the same under each of the adjusted distinct systems, and the resolution of the discretion issue should be the same for each distinct system, or for any comprehensive system replacing the distinct systems. In other words, the discretion issue should not deter consideration of adopting a comprehensive new system,

Option 4b. Partial Replacement of the Existing Distinct Systems With a Comprehensive System for Nonfuel Minerals Only

For a number of reasons, it might be considered desirable to exclude the fuel minerals (except perhaps uranium) from a comprehensive system like the one described above.

First, Congress has given considerable attention to the laws governing some of the fuel minerals—oil, gas, geothermal steam, and coal. Congress might not want to alter laws in which it had already invested so much effort, even though those laws contain many defects in common with the systems governing nonfuel minerals. This is actually an argument against making any adjustments at all to the fuel mineral leasing systems, rather than an argument against including them, once adjusted, in a comprehensive system.

Second, it would be difficult to define the Department of Energy's proper role, under its recently granted authority over some aspects of fuel mineral leasing, in a comprehensive system that combined all minerals under each claim or lease. This difficulty would be eliminated if, as is suggested (on other grounds) in one option in section F of chapter 6, the Department of Energy's authority over fuel mineral leasing were revised or revoked.

Third, there are large, known, untapped resources of some fuel minerals—for example, coal and oil shale. It has been argued that greater control should be exercised over these fuel minerals in order to prevent premature or speculative leasing and undesirable cumulative damage to the physical and socioeconomic environments. But such control would clearly be available under a comprehensive all-mineral system that made access subject to the discretion of the Secretary of the Interior. Even under a system of nondiscretionary access, these concerns could be handled adequately by appropriate diligence, payment, nonmineral resource protection, and socioeconomic impact provisions in an all-mineral system.