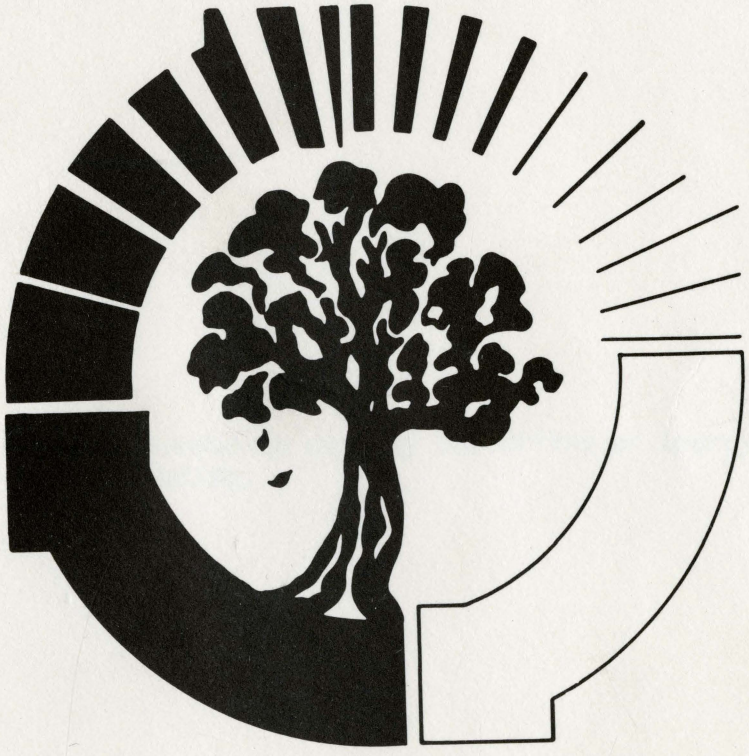
Coal

LEGAL AND ECONOMIC CONSIDERATIONS IN FEDERAL COAL LEASING

REPORT #15

Terry A. Ferrar; Barry L. Myers; and
George R. Neumann

THE CENTER FOR THE STUDY OF ENVIRONMENTAL POLICY



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Chapter I

SUMMARY AND OUTLINE

Since February 1973, there has been an effective moratorium on the leasing of federally controlled coal rights in the western plains. For a variety of reasons the Department of the Interior has withheld this national asset from development; however, this policy has not gone without question and the Department itself is not satisfied that a continuation of this moratorium is in the national interest. Nevertheless, questions concerning the optimal leasing policy continue to hamper federal officials who must behave within the sometimes conflicting goal structure of obtaining a "fair market value for the resource while assuring orderly and timely development."

In the interest of assisting federal officials in their future deliberations on this important national issue, this report outlines the economic incentives that surround the coal industry in the western states (non-reservation lands), and examines the legal constraints which define the scope of the federal action. The economic impact of a leasing regime hinges on the lease's stipulations and influence on the internal decision calculus of the firm. Fundamentally, lease stipulations produce a modification of the exploitation rate and method adopted by the firm, and (therefore) a leasing regime should be analyzed as a method of controlling or regulating private sector behavior. In this report the production impact of lease stipulations is of central concern, and is examined as a possible tool to be employed by government officials in the interest of social welfare optimization. Specifically, given the industrial structure and risk elements that characterize this industry, private behavior (generally) is not compatible with socially

optimal behavior; therefore, appropriately designed leasing regimes may be effective in distorting existing incentives in a manner consistent with a socially desirable resource exploitation plan.

In addition to specifying economic design criteria for a socially desirable leasing strategy, this analysis reviews the legal constructs which must confine any operational policy. Specifically, Chapter II reviews and assesses the legal tools currently available to federal officials as they attempt to modify private behavior through a leasing policy. Legislative history and its interpretation are carefully studied in order to provide an understanding of the legal mechanisms available. This legal superstructure is then employed to *screen* a selection of lease stipulations that recommend themselves for further consideration based on economic analysis. The output of this screening procedure results in a survey of leasing scenarios. Chapter V presents this set of policy scenarios in the format of a partial ordering which reflects both a relative and absolute assessment with respect to: (1) economic incentives; (2) legal feasibility; and (3) operational cost effectiveness. Hence, this chapter synthesizes the economic design criteria and the legal feasibility screening arguments of the preceding sections while providing insight into some popular leasing stipulations.

During the last five years, some fundamental changes have occurred with respect to coal exploitation in the western plains. Illustrative of the dynamics of these years are the following events:

1. There has been a significant movement in the coal industry toward the use of massive capital equipment in the mining process. With reference to the western plains, the use of strip and pit mining operations has resulted in the necessity of major expenditures on capital equipment in order to assure

efficient extraction of the resource. These capital expenditures imply dependence on the financial markets, and (hence) have tended to provide a competitive edge for larger firms.

2. The "energy crisis" and the uncertainty in supplies of substitute fuels have both raised the market value of coal and intensified the volatility of its price. Such market uncertainty has tended to deflect the relevant private rate of discount from the social rate of discount and (therefore) has resulted in a tendency toward a non-optimal intertemporal production pattern.

3. Simultaneous with the movement toward larger capital expenditures and volatility in price, demand uncertainties have been accentuated by environmental concerns. The environmental hazards associated with strip mining and government policy concerning the use of higher sulfur fuels have contributed to the financial risk factor in this industry.

4. Additional components of uncertainty which have impacted western coal development may be traced to questions addressing: (a) the supply of water in this region; (b) technological developments concerning liquefaction and gasification; (c) alternative designs of sulfur scrubbing mechanisms; (d) the government's continuing long-term commitment to nuclear power and the technological-environmental problems hindering its commercial employment; and (e) the potential for technological breakthroughs that will impact the energy market due to the significant commitment of government and private sector financial interests to energy related research and development.

This market uncertainty or risk factor coupled with the required massive "front end" capital commitment forms the economic Achilles' heel that thwarts the efficiency of free market operation. In this report, the effects of various lease stipulations on counter balancing these market efficiency

distorting factors are comprehensively addressed within the constraints of the existing legal structure.

While the problem of lease design is complicated by the interrelated considerations of uncertainty, environmental regulation, divergences between private and social goals, industrial organization considerations, and the general breakdown in the market mechanism, this report restricts its attention to the isolation of the salient design considerations and the provision of a partial ranking of some popular leasing scenarios. Illustrative of the necessity of carefully defining the scope of this effort has been the decision to avoid extensive empirical or computer modeling analysis of this industry, and the strict adherence to a partial equilibrium setting. Moreover, while intertemporal and diligence considerations are considered in Chapter IV, a thorough dynamic analysis of this industry has not been attempted.

While it is appropriate that a briefing document provides a taxonomy of considerations to be addressed when designing a lease policy, it must ultimately be left to the policymaker to weigh the various attributes of any given scenario at the time and in the setting of the selection process. That is, the selection of a policy must be made in complete recognition of the subtle considerations that only the policymaker, as opposed to the researcher, can appreciate. Therefore, this report circumscribes a recommended *collection of policy scenarios* as well as defines a set of *economic-legal criteria* to assist the policymaker in his deliberations. Moreover, while this effort must stop short of advocating a single policy, the following policy relevant conclusions are put forth:

> *Federal coal lands and deposits are leasable under the Act of 1920 by the prospecting permit-preference right lease system for areas where exploratory work is necessary to determine the existence or workability of coal deposits or, for land containing known deposits, by competitive bidding or by *such other methods as the Secretary may adopt.* (Chapter II)

*Before coal leases are offered, rents and royalties must be fixed at or above statutory minimums of twenty-five cents to one dollar per acre and five cents per ton respectively; however, it appears that royalties can be established on bases other than per acre or per ton so long as the statutory minimums are observed. (Chapter II)

*Leases are issued for indeterminate periods upon condition of diligent development and continuous operation with review and readjustment of terms reserved to the Secretary at twenty year intervals; enforcement of such provisions is through the cumbersome procedure of suit in the federal courts, not administrative action. (Chapter II)

*The structure of a lease will imply a risk distribution between the public and private sectors. In the interest of encouraging the socially optimal rate of resource exploitation, the major part of the risk should be imposed on the public sector. (Chapter III)

*The most significant risk component is derived from market volatility and (hence) any risk sharing leasing structure must be responsive to coal price movements. (Chapters III and IV)

*In general, risk sharing leasing regimes will permit the public sector to abstract a larger measure of resource rent than non-risk sharing regimes. (Appendix I)

*It is imperative that any leasing regime that is adopted assure that the property rights implied be well defined, exclusive, and transferable. Moreover, potential environmental problems may be minimized by requiring that the ownership of the mineral rights be attached to the ownership of the potential externally impacted land area. (Chapters III and IV)

*Historically the preference right lease system has led to suboptimal development and land-use patterns. However, such results can be avoided by the use of competitive payment schedules. (Chapter IV)

*The problems associated with "moral hazard" and speculative holding of mineral leases can be minimized by requiring a significant "front end" financial outlay at the time the lease is let. However, this procedure tends to favor larger firms due to their relative strength in financial markets; this pressure for oligopoly market structure must be recognized. (Chapters III and IV)

*While royalty rate increments may be used to control environmental insult, this must be done with a careful analysis of the total incentive package implied by such a payment scheme. (Appendix II)

*Industry nomination of tracts should be allowed to minimize the aggregate information costs, but leases should be distributed only after careful administrative review. (Chapter IV)

*Previous federal leasing policy has been rather passive with the initiative for additional leases being derived from industry sources. It has been alleged that such a practice has led to an excessive rate of leasing. Specifically, two-thirds of the federal tracts currently under lease are yet to produce marketable output. (Chapter IV)

*Diligent production requirements tend to reduce speculation and the price stabilizing effects associated therewith, but they tend to reduce the problems of moral hazard bidding and provide additional intertemporal control and information flows to the public sector. These features are particularly important for intertemporal management in times of changing relative valuations of alternative land-use patterns. (Chapter IV)

Among the alternative leasing scenarios considered in this report, only profit sharing permits the public sector to share all categories of risk--geologic, cost and price volatility--without creating production distortions. Profit sharing, however, demands extensive administrative commitment by the regulatory body and its legal feasibility is subject to question.

If it is decided that the additional administrative costs associated with the profit-sharing scenario are prohibitive, or alternatively it is determined to be legally cumbersome, then royalties or rental measures with leasee selection based on some style of competitive bidding arrangement would be desirable. Royalty structures tend to distort the production decisions of a firm in a non-optimal manner; whereas, rental payments are unable to share the risk factor as effectively as royalty schemes. However, both royalties and rental payments contain a contingent or conditional payment characteristic, hence the geologic and price related risk factors are shared by the public sector. Moreover, such payment structures are relatively convenient to administer. Coal pledge stipulations behave analogously to

royalties and, therefore, are worthy of careful scrutiny in the policy setting process.

Concerns with respect to the *rate* of leasing hinge primarily upon the problems associated with changing social valuations of land use over the length of the lease. In this respect leasing structures that permit the government to maintain long-term control recommend themselves for further consideration. A diligence clause stipulation is one way to assure such a relationship.

Alternatively (and preferably), coal lease rights should be carefully defined to assure the internalization of all extraction related costs. That is, if the ownership pattern requires the extractive agent to suffer the total costs (market and non-market) of his activities, then we would be assured that his land-use plans would be consistent with the socially optimal land-use pattern. However, the feasibility of operationally specifying a lease in such a manner as to assure this comprehensive ownership pattern is in question. Indeed, when long-term intertemporal aspects are of relevance, then administrative feasibility of this alternative is brought into severe question due to the potential for errors in foresight. For these reasons, together with the legal questions that would surround such a proposal, diligence requirements and sequential leasing appear to be the most reasonable instruments to assure long-term socially acceptable land-use patterns in the western coal fields.

Chapter II

LEASING FEDERAL COAL LANDS

A. Executive Summary

The present authority to lease coal arises under the Mineral Leasing Act of 1920 and the Acquired Lands Act of 1947. The 1920 Act supplanted the previous location and patent system which gave ownership interests, rather than lease interests, to coal deposits. Leasing is now the only means to acquire rights in federally owned coal.

The coal lands and deposits leasable under the 1920 Act are (1) public domain lands; (2) national forest reserve; and (3) lands disposed of by the United States under public land laws that reserved coal deposits underlying the lands to the United States. The 1947 Act subjects acquired lands to the 1920 Act. The lands subject to the act are essentially found in those states west of the Missisippi River, except Iowa, Kansas, Missouri, parts of Oklahoma, and Texas; and also in Florida, Louisiana, and Mississippi. Many of the coal reserves owned by the United States underlie lands where the surface was disposed of to private citizens in earlier years. The specific statute under which the split in ownership occurred may impose restrictions upon the extraction of coal from beneath the surface even though such restrictions are not found in the 1920 Act itself.

The Secretary of the Interior is given the power to issue leases and prospecting permits by the Leasing Act. However, he is not *required* to issue permits or leases and may accordingly withhold such issuance as he has since February 1973.

When the Secretary does issue permits and leases, he is confined to certain types of leasing schemes. Where workable deposits are known to

exist he must lease through either (1) competitive bids, or (2) other methods as he may by regulation adopt. Only method (1) is currently in use. In areas where workable deposits are not known to exist, he may issue prospecting permits. When, after exploration, coal in commercial quantities is discovered, the permit holder is entitled, as a matter of right, to a (preference-right) lease on the lands subject to the permit. The preference-right leasing system has led to a scatter of coal leases throughout the public domain. Strategies of consolidation of these leases is beyond the scope of this report.

Numerous general and specific requirements apply to the leases. Holdings by any one person, association, or corporation in permits and leases cannot exceed 46,080 acres in any one state, with minor exceptions. But, corporate holdings are directly attributed to corporate shareholders only in the instance where such person or corporation owns ten percent or more of the stock of a given corporation.

Prospecting permits are issued in the discretion of the Secretary where it is necessary to establish the existance or workability of coal. Permits are issued on a first come-first served basis, for a period of two years, but may be extended in time or cancelled for lack of due diligence in the prospecting. One permit may not exceed 5120 acres of contiguous or compact tracts. Upon discovery of coal in commercial quantities, the permit holder is given preference over all others in securing a lease (known as a preference right lease).

The *preference right* lease cannot be withheld by the Secretary if the permit holder proves coal in commercial quantities. The leases are thus controlled by the issuance or withholding of permits. Statutory requirements

concerning rentals, royalties, and other lease provisions do not differentiate between preference right, competitive bid, or other types of leases. These names refer solely to the method of award by the government.

Competitive leases can be offered for tracts of forty acres or multiples of forty acres but no absolute size is specified. The limiting size factor is that no one person or organization may own permits and leases totalling more than 46,080 acres in any one state. Hence, this figure can be exceeded only through multi-state leases. The form of the competitive bid is undefined in the statute, therefore, sealed bid and public auction are minimum alternatives. The specific nature of the bid seems to be intended as a bonus bid, but argument can be made to support other types of bid subject matter.

Types of leasing other than preference right or competitive bid are authorized by statute at the discretion of the Secretary; but no regulations have been issued which set forth other laternatives.

Rents and royalties are stated in the law in terms of *minimum values* allowed to be charged under any lease. *Actual rents and royalties can and are set above these minimums.* Rentals must not be less than twenty-five cents per acre for lease year one; fifty cents per acre for lease years two, three, four, and five; and one dollar per acre for lease year six and beyond. Royalties must be a minimum of five cents per ton. They can, and are presently, set as a percentage of the value of the coal produced. Although this method is not stated as allowable, it can be used by making sure that the actual royalty payable satisfies the statutory five cents per ton in all cases. Both rentals and royalties are required to be *set in advance of offering the lease.* This requirement makes royalty and rental bidding schemes

subject to questions of statutory interpretation. For example, if a royalty is set in advance, can bidding occur on a "bonus" or "additional" royalty. It is certainly arguable that such bidding could occur, but such a scheme has not been legally tested.

Coal leases are issued for indeterminate periods upon condition of (1) diligent development, and (2) continued operation of the mine or mines. Readjustment of terms may be made by the Secretary at twenty year intervals, however. This adjustment can include adjustment of rents and royalties.

Additional lease provisions include modest environmental protection requirements.

Leases may be cancelled administratively for non-payment or through court action for the violation of other requirements. The more burdensome avenue of court action makes cancellation actions undesirable from an administrative cost standpoint.

B. Introduction

This chapter explores the basis upon which federally controlled coal deposits can be leased for exploitation. The legal authority from which the power to lease arises will be explored, the geographic extent of that power will be defined, the interests leasable will be specified and the salient terms and conditions of federal coal leases will be delineated.

C. Authority for Leasing of Federal Coal

In 1807 Congress passed a public land act authorizing the leasing of lead mines in the Indiana Territory. The experiment proved unsuccessful, and the mine lands were subsequently sold at $2.50 per acre.[1] In the Upper

[1] Reitz, J., Arnold W., *Environmental Planning: Law of Land Resources*, (1974) p. 13-1.

Mississippi Valley, leasing of lead mines continued until 1846. During this period, two important cases were decided by the U.S. Supreme Court. In 1840 *United States v. Gratiot*[2] held that the "power to dispose of" as written in the property clause of the Federal Constitution conferred upon Congress the authority not only to sell public lands but also the power to lease. And, a few years later it was held that the unauthorized mining of public domain lands is a trespess actionable by the government.[3]

Beginning in the latter half of the nineteenth century, Congress and the President began to deal with coal lands differently than they had dealt with other mineral lands. For example, the coal act of 1864 excluded coal lands from the operation of the Preemption Act of 1841. In 1873 Congress provided for the sale of coal lands at a price higher than for nonmineral lands. In 1906, President Roosevelt, concerned about fraudulent activities under the 1873 Act, issued an executive order withdrawing from entry about sixty-six million acres of coal lands which were to be reclassified to be sold at the higher prices applicable to coal lands. The following year the first of several acts was passed by Congress that allowed surface entries with the mineral rights to coal being reserved to the United States.[4] *Accordingly, these acts created a separation of subsurface rights from surface ownership, The 1873 Act continued to provide the basic coal disposal legislation until it was supplanted by the Mineral Leasing Act of 1920.*[5]

The 1920 Act gave the Secretary of Interior authority to issue limited licenses, prospecting permits, and leases. The limited license is used

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[2]14 Peters (U.S.) 526, (1840.

[3]*U.S. v. Gear*, 3 Howard (U.S.) 120, (1845).

[4]Reitze, *supra*, note 1, p. 13-10.

[5]Act of February 25, 1920, 41 Stat 438 (1920), 30 U.S.C. sec 201 et seq.

primarily to permit municipalities to mine coal in small areas for the benefit of impoverished families. Two-year permits to prospect for coal in unproved land may be issued at the discretion of the Secretary. There are acreage limitations and the Secretary requires a clear showing that market conditions justify the permit. The prospecting permit is a prerequisite to the issuance of a preference right lease. Such preference right leases are issuable only on the showing that coal in commercial quantities exists in the desired leasehold area. Leases may also be offered on a competitive bid basis or by other means for lands where coal is known to exist. The Act provides for payment of minimum rentals and royalties.

The pursuit of operations under a coal lease, license or permit is affected by a wide variety of laws dealing with environmental concerns such as water pollution, soil and water conservation, wildlife, etc. Consideration of these laws is beyond the scope of this paper. Furthermore, significant legislation dealing with these environmental concerns of mining as well as the right of surface owners is being considered by the Congress and the President at this time.

1. Lands Subject to Leasing

The coal lands and deposits covered by the 1920 Act are specifically enumerated as (1) *public domain lands*, (2) *national forest reserve*, except those acquired under the Appalachian Forest Act,[6] and (3) *lands disposed of by the United States under public land laws that reserved appropriate mineral deposits to the United States.*

Expressly excluded from operation of the Act are (1) lands in national parks, (2) lands within incorporated cities, towns and villages, (3) lands

[6] 16 U.S.C. secs. 513-519.

within national monuments, (4) lands in naval petroleum and oil shale reserves, (5) Indian lands,[7] and (6) lands acquired under other acts subsequent to February 25, 1920.[8]

Lands acquired under other acts subsequent to February 25, 1920, such as by voluntary agreement, condemnation, foreclosure, devise, succession, or gift, are subject to leasing under the Acquired Lands Act of 1947.[9] Under this act, acquired lands can be leased on the same terms as lands are leasable under the 1920 Act; however, permits and leases cannot be issued without the consent of the head of the governmental agency having jurisdiction over the lands containing such deposits.

2. Definition of Specifically Enumerated Lands

a. Public Domain Lands--

Referred to as the public domain or public lands, these are lands owned by the United States which are subject to sale or disposal under federal public land laws. This does not include acquired lands, lands reserved or withdrawn from the public domain, lands valuable for purposes other than mineral extration, lands below the low-water mark of ocean waters,[10] or lands

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[7]Under the Act of May 11, 1938, 25 U.S.C. sec 396 (1964) and other acts which apply to specific reservations, Indian lands can be leased through the office of the Commissioner of Indian Affairs.

[8]Coal deposits on lands withdrawn or reserved for military or naval purposes were originally excluded from the Act but a 1946 amendment removed this exclusion. Also, originally excluded were coal deposits in Alaska because they were leasable under the provisions of the Act of October 20, 1914, 38 Stat. 742, 48 U.S.C. sec. 434. Special legislation in 1959, Act of September 9, 1959, 73 Stat. 490 did away with the provisions of the 1914 Act and brought the Alaskan lands under the coverage of the 1920 Act.

[9]30 U.S.C. secs. 351-359.

[10]The Submerged Lands Act and the Outer Continental Shelf Lands Act, which only specifically mention oil, gas, sulfur, and uranium, allow other minerals which are found to be leased.

under navigable waters or tidelands. Title to public lands was originally vested in the United States through conquest, treaty, or purchase from a foreign nation or cessions from the states. In contrast, "acquired lands" are those lands which either were never part of the public domain or although once part of the public domain, were in private or state ownership at the time of acquisition by the federal government. "Withdrawn lands" are those "temporarily" removed from the public domain for a public purpose; whereas "reserved lands" are those set apart by Congress or by a federal agency pursuant to statutory authorization, for special public use such as national forests, Indian or military reservations, national parks, etc.

Land east of the Mississippi River and north of the thirty-first parallel originally was all owned by the thirteen founding states or by private citizens. The United States acquired lands there only through cession. Hence, there never were any public domain lands in Connecticut, Delaware, Georgia, Maryland, Massachusetts, New York, New Jersey, New Hampshire, North Carolina, Pennsylvania, Rhode Island, South Carolina, Virginia, or the four states carved from them—Kentucky, Maine, Vermont and West Virginia. Lands ceeded by these states vested fee simple absolute title in the United States except for reservations such as the North Carolina reservation for creation of the state of Tennessee and except for private rights created by valid grants made to persons prior to United States acquisition. The remaining public domain lands, except for Texas, were acquired by purchase from foreign nations or by conquest and treaty. Texas was annexed in 1845 on its own application and retained title to all public lands within its borders. In four states—Illinois, Indiana, Ohio, Iowa—nearly all public lands were disposed of before enactment of the leasing act. The public domain is

essentially found in those states west of the Mississippi River, except Iowa, Kansas, Missouri, parts of Oklahoma, and Texas, and also in Florida, Louisiana and Mississippi.

b. National Forest Reserves--

These lands are not considered public lands and are specifically enumerated in the act separately. All the forest reserves are included except those set aside under the Appalachian Forest Act.

c. Lands Disposed of by the United States--

It is well established that to determine the extent of ownership received by persons acquiring what were once public lands, reference to the specific statute which authorized the disposition, patent or sale must be made. The reserved coal rights are statutory and vary from statute to statute and hence among reservations occurring under differing statutes. Also because of their statutory nature rights and liabilities of surface and subsurface owner may well differ from those recognized by application of Common Law rules or state statutes to surface and subsurface ownership severed by private land transfer.

The earlier federal acts providing for the reservation of coal provided specific statements concerning rights and liabilities. So, for example, during the first decade of this century the U.S. Geological Survey undertook a comprehensive investigation of mineral resources on the public domain; and, as a result, many thousands of acres were classified as valuable for coal. Those persons who had previously located, selected or entered such lands under non-mineral land laws were subject to having their entries cancelled upon reclassification. However, the Act of March 3, 1909,[11] gave good

[11] 30 U.S.C. sec. 81.

faith entries patents to their lands but reserved ownership of the coal to the United States. The reservation provided that the U.S. reserves all coal and the right to prospect for, mine, and remove the same, but no person shall enter upon the land to prospect for, or mine and remove coal, without previous consent of the owner, except upon such conditions as security for and payment of all damages to the owner caused by the mining action.

In 1910 it was allowed that unreserved lands of the United States already withdrawn or classified as coal lands, or valuable for coal could be entered under the homestead laws or desert land acts, with a view of passing title with reservation to the United States of the coal in such lands.[12] The 1910 act specifically reserved to the United States the coal and the right to prospect for, mine, and remove same. Any person qualified to acquire the coal has the right, under the act, to enter upon the lands for the purpose of prospecting for coal, upon approval of the Secretary of Interior of a bond to be filed with him as security for the payment of all damages to the crops and improvements on such lands caused by such prospecting. A person who acquires coal deposits from the United States may, under the act, occupy so much of the surface as may be required for all purposes reasonably incident to the mining and removal of the coal, and may mine and remove the coal, upon payment to the owner of damages caused thereby.

In 1912 other lands were disposed of with reservations of coal and the 1916 Stock-Raising Homestead Act reserved all minerals. All acts since that time have contined a general reservation of all minerals.

The specific reservation is of importance because coal leasing must be carried on subject to such conditions as are or may be provided by the laws reserving such deposits.[13]

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[12] 30 U.S.C. secs. 83-85.

[13] 30 U.S.C. sec. 182.

Recent attempts to enact a federal strip mine bill have had as partial impetus the desire to secure greater rights in surface owners than would be their right under the law under which the coal rights were reserved. For example, the Mansfield Amendment, which, though considered, was rejected, would have virtually prohibited disturbance of the surface by a subsurface owner in his attempt to extract his coal by strip mining.

3. Requirements to Lease--

While the Secretary of the Interior is authorized to lease coal lands under the 1920 Act and the guidelines under which such leasing will be accomplished are spelled out there; no affirmative duty rests with the Secretary to issue prospecting permits or competitive leases. The statute specifies:

> "...he shall, in his discretion,...from time to time. offer such lands or deposits of coal for leasing...by competitive bidding...."[14]
>
> "...the Secretary...may issue...prospecting permits."[15]

Preference right leases acquirable by a prospecting permittee upon a showing that the land for which he holds his permit contains coal in commercial quantities must be issued without discretion. The statute specifies:

> "...the permittee shall be entitled to a lease...."[16]

This right though, may be controlled through the discretionary ability to withhold permits.

Pursuant to this authority a moritorium was placed on federal leasing in February 1973.

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[14] 30 U.S.C. sec. 201(a).

[15] 30 U.S.C. sec. 201(b).

[16] *Ibid.*

D. Interests Acquirable Under the Act of 1920

Federal coal lands and deposits as defined above are available for private development in the discretion of the Secretary of the Interior either through (1) competitive leasing, (2) by prospecting permits with a preferential right to lease, or (3) other methods as he may adopt consistent with the act. Lands containing known workable deposits of coal are not available under the prospecting permit-preference right lease (PP-PR) system. The PP-PR system is used when exploratory work is necessary to determine the existence or workability of coal deposits in any unclaimed, undeveloped area.[17] Limited coal licenses are available as a short term, non-commercial citizen relief measure. All permits, leases, or licenses granted on lands disposed of with a reservation of coal must be utilized in full compliance with the law under which the reservation was made, as discussed above. The details of these acquirable interests are discussed in this section.

1. Current Scatter of Leases

Leasing practices, especially the PP-PR system, has led to a scatter of coal leases through the public domain. A full exploration of methods or strategies of consolidation of these leases is beyond the scope of this report, but it nevertheless may be observed that cancellation of nonoperational leases may be effected through suit under the diligence requirement discussed below. Furthermore, collective development and operation of a coal field may be accomplished by arrangement among leasees and upon approval of the Secretary under the August 31, 1964 amendment (Pub. L. 88-526) to the leasing act.

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[17] *Ibid.*

2. Limited Coal Licenses

In order to provide for the supply of strictly local domestic needs for fuel, the Secretary may issue limited licenses and permits to individuals or associations of individuals, but not to corporations, to prospect for, mine, and take for their own use but not for sale or barter, coal from the public lands without payment of royalty. Such permits or limited licenses are also available to municipalities upon the condition that the municipality mine and dispose of the coal, without profit, to residents of such municipality for household use.[18]

The tracts available to individuals or associations are forty acres or less and to municipalities up to a maximum of 2,560 acres depending upon population. The permits are available for periods of up to two years, but may be revoked at any time and may not be issued for lands already under lease. These licenses do not play a significant role in the leasing scheme.

3. Prospecting Permits and Leases

Under the leasing system, a distinction is made between areas where workable deposits are known to exist and areas where such deposits are not known to exist. The former are leased by competitive bid whereas the latter are leased under the PP-PR system. Holdings by any one person, association or corporation in permits and leases shall not exceed 46,080 acres in any one state unless it can be shown that the applicant requires additional lands to carry on business economically, in which case up to 5,120 additional acres may be granted if it is believed to be in the public interest.[19] Leases for such additional acres may be cancelled by the Secretary when the reasons for issuance no longer justify continuance of the lease.

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[18] 30 U.S.C. sec. 208.

[19] 20 U.S.C. sec. 184(a).

The accountable acreage of a party owning an undivided interest in a lease or permit, or one who owns an interest in a corporation or association, shall be such party's proprtionate part of the total lease or permit acreage except that in the case of a corporation or association such person must be the owner of more than ten percent of the ownership of such organization to be charged with a pro rata share.[20] This provision is designed to prevent concentration of leases in the hands of a small group of individuals or organizations. However, by owning a significant, but less than ten percent, share of the stock of one or more corporations it is possible to maintain considerable influence and control over lease acreage in excess of the statutorily defined limit. Accordingly, by one corporation owning shares of another corporation (less than ten percent) it is possible to exert influence over vast holdings. Because of the complexity of corporate ownership it seems difficult to enforce the spirit and intent of this provision. Furthermore, where collective development and operation is authorized, acreage limitations can be waived.

Coal leases and permits apply to coal only and not to associated and related minerals as is the case under some other leased minerals. The Secretary is, however, authorized to issue separate leases for different leasable minerals on the same lands provided the later lease would not unnecessarily interfere with the prior leasee's operation and would be consistent with sound conservation practices.

Organizations operating common-carrier railroads may be granted permits or leases only for their own railroad use. Further, such railroads may hold under permit or lease not more than 10,240 acres aggregate nor more than

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[20] 30 U.S.C. sec. 184(e)(1).

one permit or lease for each 200 miles of its railroad lines served or to be served from such coal deposits exclusive of spurs or switches and exclusive of branch lines built to connect the leased coal with the railroad, and also exclusive of parts of the railroad operated mainly by power produced otherwise than by steam. The value of this old provision in light of present circumstances has been questioned by the Land Law Review Commission and others.

a. Prospecting Permits

A prospecting permit will be issued only if it is determined that prospecting is necessary to establish the existence or workability of coal deposits in the applied for lands. It is issued in the discretion of the Secretary. The application for such a permit is to be accompanied by a proposed plan and method for conducting prospecting or exploratory operations on the land, setting forth (1) the estimated cost of carrying out the proposed prospecting operations, and (2) the diligence with which such operations will be prosecuted.[21]

Permits are issued on a first come-first served basis, for a period of two years. Permits may be extended by the Secretary for a period of two years, if he finds that the permittee has been unable, with the exercise of reasonable diligence, to determine the existence or workability of coal deposits in the area covered by the permit, and he desires to continue further exploratory work or for other reasons the Secretary deems sufficient for such extension.[22] On the other hand, the Secretary has the authority to cancel any prospecting permit upon failure of the permittee to exercise due

[21] 43 C.F.R. sec. 3511.2-1(b)(1).

[22] 30 U.S.C. 201(b).

diligence in the prosecution of the prospecting work in accordance with the terms and conditions stated in the permit.[23]

The area covered by any one permit may not, by statute, exceed 5,120 acres[24] of contiguous tracts or tracts in reasonably compact form. This differs from competitive leases where no practical restriction exists as to actual size of the leased tract. Rental is charged for the permit at the rate of twenty-five cents per acre per year.

A prospecting permit is a prerequisite to issuance of a preference right lease.

b. Preference Right Leasing

If within the period of issue of a prospecting permit or an extension thereof "the permittee shows to the Secretary that the land contains coal in commercial quantities,[25] the permittee shall be entitled to a lease... for all or part of the land in his permit."[26] This statutory provision grants to the permit holder an enforceable right to obtain a preference right lease upon the required showing of coal in commercial quantities. The Secretary is not granted discretion to issue the lease, but he can control the issuance of preference right leases through his discretionary power to issue or withhold prospecting permits. Neither the statute nor the regulations define "coal in commercial quantities" but administrative definitions of the test required for making such determination are established. They can, of course, be administratively altered.

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[23] 30 U.S.C. sec. 183.

[24] 30 U.S.C. sec. 201(b).

[25] 30 U.S.C. sec. 201(b); 43 C.F.R. sec. 3520.1-1(a).

[26] 30 U.S.C. sec. 201(b).

c. Competitive Leasing

The Secretary is authorized by statute to divide any of the coal lands or deposits owned by the United States into leasing tracts of forty acres or multiples and in such form as, in his opinion, will permit the most economical mining of the coal in such tracts, and he shall, in his discretion, upon request of a qualified applicant or his own initiative offer such lands and deposits for leasing.[27] No absolute maximum limitation is set on the size of tracts offerable but the provisions concerning maximum holdings by any one person are applicable. Such leases are to be awarded by competitive bidding or by such other methods as he may by general regulations adopt, to any qualified applicant.[28] Competitive bidding is undefined but does certainly allow for sealed bid and public auction alternatives at a minimum.

It appears that the subject matter of the bid certainly would include lump-sum payments, and arguably could encompass "surplus" or "addition" rental or royalty as discussed in Chapter V. The difficulty presented is that the statute specifies setting of rents and royalties in advance of offering the lease; consequently, it could also be argued that rental and royalty bidding over and above the set rental or royalty violates the spirit and intent of the statute.

In establishing leasing units all material factors, such as character and depth of the coal deposits, topography, adjacent private coal lands, proximity of rail and water transportation, and the investment reasonably required to provide the requisite development and operating facilities will be considered.[29] No system for assigning values or relative weights to

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[27] 30 U.S.C. sec. 201(a).

[28] *Ibid.*

[29] 43 C.F.R. sec. 3520.;-2(a)(2).

these factors is specified in the statute; accordingly, their evaluation is left to the Secretary.

Proposed offerings for lease must, by statute, be given in a newspaper of general circulation in the county in which the lands are situated.[30] No requirement is established which would prohibit wider advertising.

d. Other Types of Leasing

While the leasing statute talks only about competitive bid leases and preference right leases by specific reference, 30 U.S.C. sec. 201 refers to leasing "by such other methods as he the Secretary may by general regulations adopt." No regulations are found which qualify this statement, and it appears to be, accordingly, undefined. Whether or not this phrase could serve as a basis for a posted price lease, negotiated price lease or some other type of lease pricing is unclear but the possibility would appear to exist. To utilize this provision regulations for a new leasing concept would need to be adopted.

e. Additional Lands Leasable

(1) Contiguous Lands—Any holder of a coal lease may, with the approval of the Secretary upon a finding by him that it will be for the advantage of the leasee and the United States, secure modifications to his original lease by including additional coal lands or coal deposits contiguous to those already leased but in no event can the total area embraced in the modified lease exceed an aggregate 2,560 acres.[31]

(2) Exhaustion of Deposits—On satisfactory showing by a coal leasee to the Secretary that all workable deposits of coal covered by his

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[30] U.S.C. sec. 201(a).

[31] U.S.C. sec. 203.

lease will be exhausted, worked out, or removed within three years, the Secretary may in his discretion, lease to such leasee an additional tract of land or coal deposits, which including the coal area remaining in the existing lease, shall not exceed 2,560 acres.[32] Such lease will be let through the same procedure and under the same conditions as in the case of an original lease, and will therefore be offered either competitively or through the PP-PR system in accordance with 43 C.R.F. subpart 3520.

4. Lease Provisions

As noted above, the Secretary of the Interior has almost complete discretion to issue or not issue permits and leases. Administrative discretion to establish lease terms and conditions is likewise broad. This section will examine some of the more salient terms and conditions of coal leases.

a. Maximum Acreage—

Holdings in permits and leases shall not exceed 46,080 acres in any one state. There is no statutory limitation on the acreage that may be included in any one leasing tract but PP-PR leases are restricted because of the maximum acreage provision for prospecting permits. Earlier versions of the law did carry maximum acreage limitations on competitive bids, but they have been deleted.

b. Rents and Royalties—

(1) Royalties—For the privilege of extracting coal from leased lands the leasee is required to pay royalties as may be specified by the Secretary and inserted as part of the lease. Such royalties must be a

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[32] 30 U.S.C. Sec. 204.

minimum of five cents per (2,000 pound) ton[33] but can be set at any amount above that figure and can be determined on bases other than tons mined, such as percentage of the value of the coal produced, so long as such calculation also satisfies the statutory five cent per ton minimum. Present practice in setting royalties is discussed below.

Royalties, by statute, must be fixed in advance of offering the lease[34] and are required by regulation to be set out in the notice of competitive lease offer.[35] This provision could create a legal stumbling block for proposed royalty bidding schemes. It is arguable, at least, that if the act were to be interpreted broadly bidding could occur on any basis, including a "surplus" royalty. Or, stated differently, allow the lease to set a minimum royalty in advance then have bidding proceed not on a lump-sum payment, but rather have bidding proceed on an additional royalty over and above the minimum required in the notice of bid.

(2) Rents—Also required by statute is an annual rental, payable yearly in advance, at rates as may be specified by the Secretary which shall not be less than:[36]

twenty-five cents/acre for Lease year 1;

fifty cents/acre for Lease years 2, 3, 4, 5;

one dollar/acre for Lease year 6 and beyond.

Rentals shall be paid during the continuance of the lease; however, the rental for any year must be credited against (and thereby being subtracted from) the

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[33] 30 U.S.C. sec. 207.

[34] *Ibid.*

[35] 43 C.R.F. sec. 3503.3-2(a).

[36] 30 U.S.C. sec. 207; see also 43 C.F.R. sec. 3503.3-1(b)(1).

royalties as they accrue and become payable for that year. Rentals can be set at any figure above these minimums by the Secretary.

Rentals, by statute, must be fixed at a given rate by the Secretary, prior to the offering of the leases to prospective leasees. This requirement, as with the royalty one, creates a stumbling block for rental bidding schemes.

(3) Change of Rents and Royalties—Once the rental and royalty is set and incorporated into the lease it cannot be increased by the Secretary except at the expiration of each twenty-year period. While not specifically authorized or prohibited, it would also appear that royalty and rental increases could be made by mutual agreement between the Secretary and leasee.

Waiver, suspension, or reduction of the rental, or the *minimum* royalty may be done by the Secretary (1) for the purpose of encouraging the greatest ultimate recovery of coal, and (2) in the interest of conservation of natural resources whenever, (3) in his judgment, (a) it is necessary to do so in order to promote development or, (b) the leases cannot be successfully operated under the terms provided.[37]

(4) Actual Rents and Royalties—Royalty and rental charges on preference right leases and competitive leases are at the present identical in practice.[38] Rental is based on quantity, quality, and minability of the coal deposit and royalty is fixed as a percentage of the value of the production of the deposit but not less than five cents per ton.[39] These figures

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[37] 30 U.S.C. sec. 209.

[38] *Federal Leasing and Disposal Policies*, hearings before the Committee on Interior and Insular Affairs, U.S. Senate, June 19, 1972, p. 229.

[39] Hearings, pp. 118 and 229.

are determined under fair market value concepts which involve calculations intended to approximate the value which would be obtained if actual competition did exist.[40]

c. Lease Period and Diligence Requirements—

Leases are issued for indeterminate periods upon condition of (1) diligent development, and (2) continued operation of the mine or mines. Exceptions are made for interruptions resulting from strikes, the elements, or casualties not attributable to the leasee.[41] Readjustment of terms at twenty-year intervals is reserved to the Secretary as noted above.

(1) Diligent Development—This term remains largely undefined but clearly refers to the developmental phase of the operations and not to the operational one. The concept of requiring a "due diligence" in marketing gas has been interpreted to mean whatever under the circumstances, would be reasonably expected of operators of ordinary prudence.[42] Such an interpretation of "diligence development" would also seem reasonable.

(2) Continued Operation—The concept of continued operation can also be viewed in terms of the "due diligence" definition above which would require operation reasonable under the circumstances.

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[40] Hearings, p. 229. It is interesting to note that 30 U.S.C. sec. 191 directs the disposition of the monies received as rents and royalties under the Leasing Act, rather than merely allowing them to become general Treasury revenues. The provision requires 37½ percent to be paid to the State within which the leased lands lie for the construction and maintenance of public roads or for the support of public schools or other public eduational institutions and that 52½ percent be paid into the reclamation fund created by the Reclamation Act. The other ten percent becomes general Treasury revenue.

[41] 30 U.S.C. sec. 207.

[42] *Eggleson v. McCasland* (D.C. Okl 1941), 98 F. Supp 693.

(3) Suspension of Operations—In lieu of the requirement of continuous operation the Secretary may, upon a judgment that the public interest will be served, provide in the lease for payment of an annual advance royalty on a minimum number of tons of coal, which in no case can aggregate less than the amount of the minimum annual rental provided for by statute. Such suspension of operation cannot be authorized for more than six months at any one time and when market conditions are such that the lease cannot be operated except at a loss.[43]

The Secretary can also direct or assent to the suspension of operations for the purpose of encouraging the greatest ultimate recovery of coal and in the interest of conservation of natural resources, or to promote development or operations. If suspension is affected in this manner, payment of rental or royalty specified in the lease will also be suspended during the period of operational suspension. The term of such suspended lease will be extended by adding to it the suspension period.

d. Environmental Protection—

Under the current policy of the Department of the Interior, leasees are required by lease provision, inserted under the discretionary power of the Secretary, to take such steps as are necessary to prevent operations including plant operations, from unnecessarily:[44]

(a) causing or contributing to soil erosion or damaging any forage and timber growth on the leased lands or on lands in the vicinity,

(b) polluting air and water,

(c) damaging crops of a surface owner,

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[43] 30 U.S.C. sec. 207l.

[44] Hearings, p. 232.

(d) damaging improvement of surface owners,

(e) destroying, damaging, or removing fossils, historic ruins or artifacts.

The leasee further is required to agree to restore, so far as reasonably possible, the surface of the leased land and access roads to its former condition, including the removal of structures as and if required.

Legislation introduced, but not as yet enacted, into the Congress and aimed at protection of the environment caused by mining excesses could cause broad and widespread changes in the leasing conditions.

e. Lease Termination and Cancellation—

Failure to pay the lease rental on or before the anniversary date of the lease automatically terminates the lease. Failure by the leasee to adhere to other terms or conditions of the lease, the statute, or regulations issued pursuant to the statute does not result in such automatic cancellation. The procedure to be followed is to bring an action in the appropriate Federal District Court for forfeiture or cancellation.[45] Such action is cumbersome and expensive and its use is thereby discouraged.

[45] 30 U.S.C. sec. 188(a).

from perturbations in market prices and vacillation in government environmental policy concerning permissible use and extraction techniques. Although coal is geologically definable as a resource (in contrast to other energy resources such as oil and natural gas), the industry is not free of risk from legal and economic uncertainties.

Exclusivity and transferability of lease rights are brought into question by existing institutional leasing patterns. Moreover, the assumption of a competitively structured industry and labor market for western coal development may not be feasible. Thus, in designing a leasing regime one cannot be assured of its neutral effect on the efficiency of resource exploitation. Furthermore, while under the idealized conditions stated above, excessive speculation and the need for diligence requirements within a leasing structure would not be a concern, we are not assured that existing speculative behavior is necessarily reflecting the optimal reservation of this resource for future uses.

This chapter, together with accompanying appendices, argues that leasing regimes should be designed in such a manner that the rent on the resource is transferred to the government sector under a *contingent* payment pattern. Such contingent payment schemes permit the government to share the risk element and (hence) encourage private sector development behavior that is more socially acceptable. Specifically, by sharing the risk, the net risk impacted discount rate employed by the private developer will tend to approximate the socially optimal discount rate. Such contingent payment schemes, since they reduce the required front-end capital outlays, also tend to encourage competitive market structures in the industry.

In summary, this chapter argues that the impact of risk on the extractive process can be minimized and competitive behavior encouraged by designing a

leasing regime that extracts the resource rent for the Treasury via a contingent payment structure. Guidelines or design criteria are derived for structuring appropriate leasing policies. These guidelines are then employed in the remainder of this report, with a composite review of various leasing policy scenarios provided in Chapter V.

B. Introduction

This report defines and evaluates, in terms of implied economic incentives and legal feasibility, a selection of leasing regimes for federal land resource development and (in so doing) the concept of *regime efficiency* is of primary importance. Efficiency in this context must include a recognition of the efficiency of resource exploitation (commonly accepted to mean maximization of the present value of the resource at all points in time), negotiation, contract formation, policing, and environmental costs. In part, this study will review these costs and the policy trade-offs that must be considered when evaluating or proposing a leasing strategy.

Let us comment upon the concept of efficient resource exploitation. Specifically, ignoring negotiation, contractual, administrative, and environmental costs, what is the character of the leasing regime that will assure efficient resource exploitation? Many have observed (most recently Professor Cheung[1]) that different contractual arrangements do *not* imply different efficiencies of resource allocation, as long as the property rights are *well defined, exclusive, transferable* and all relevant behavior is *competitive*. Any regime that satisfies these conditions will yield efficient exploitation of the resource. Hence, if we could exhaustively specify this collection of

[1] "Transaction Costs, Risk Aversion, and the Choice of Contractual Arrangements," Steven, M. S., *Journal of Law and Economics*, Cheung, 1969, pp. 23-42.

leasing regimes, then in order to select a leasing policy we would only have to concern ourselves with the secondary costs of the structure.

It is of importance to note that within this characterization of sufficient conditions for a leasing structure, speculation or diligence requirements were not addressed. Under the rather pure market conditions implied by these property right specifications there would be no inappropriate speculation and diligence requirements would not be relevant. Specifically, if property (or lease) rights are well defined, exclusive, transferable and in a competitive market setting, this would assure that these rights would find their way to the most socially productive employment. Under these conditions, if speculation did occur, it would necessarily reflect that the reservation of this resource for future uses was the most socially desirable current employment pattern.

Having said this, let us recognize that contractual arrangements may differ significantly in their operational likelihood of satisfying these requirements. The concept of well-defined rights is brought into question by the existence of uncertainty in either the production process or marketing characteristics of the exploitation activity. It should be noted that if lease rights were well defined, then that definition would include a specification of permissible impacts on the surrounding environment during the extractive process. Environmental "externalities" would not exist under such a comprehensive definition of rights. More specifically, it is the lack of clearly defined ownership of the various attributes of the environment (e.g., aesthetic, water and air resource, rights of future generations, etc.) that gives rise to the "environmental problems" in our economy. Thus, a complex set of environmental regulations implicitly defining these ancillary ownership

properties should accompany any lease document. (Additional information concerning externalities and leasing is provided in Appendix II.) Quite often the assumption of approximate competitive behavior is not viable (in fact the leasing regime itself may effectively preempt such behavior, as will be argued later); and exclusivity is often unobtainable if the resource possesses flow or migration characteristics (as in oil and natural gas fields). In this context, it is of interest to note that the transferability condition may be approached by more intensive lease swapping among current lease holders. Currently, the administrative ease of lease swapping is under the control of the Secretary of the Department of the Interior. Therefore, if one is seeking a regime that satisfies the criteria of efficient resource exploitation, he should confine his discussion to that set of regimes that are operationally most likely to satisfy these conditions. Within this set, the selection of the regime that minimizes the secondary costs of contract negotiation, formation, policing, and environmental insult should be made.[2]

C. Uncertainty, Industrial Structure, and Leasing Regimes

This section reviews some well accepted principles concerning leasing under uncertainty and examines how a regime may impact the market organization of the industry. The source of uncertainty in western coal exploitation is studied and a definition of the central terms and concepts used in this work is presented. Moreover, a set of leasing regime design criteria is developed and in a later section this set of design criteria will be employed to provide a partial ordinal ranking of a selection of leasing policy scenarios.

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[2]It is appropriate to point out that this step-wise selection process ignores the trade-offs that may exist between secondary costs and efficiency reductions; without an empirical study the importance of this trade-off possibility is impossible to specify (although discussed qualitatively later in this report).

As a foothold to begin the discussion of uncertainty and market structure, consider the paradigm of a competitively structured industry operating in a world of absolute certainty. This assumption argues that the resource is specified in terms of mass, quality, location, and extraction costs, and that all present and future market prices are available with absolute certainty; moreover, it is assumed that the leasing policy will not significantly impact the industrial organization. Under these conditions, it may be asserted that *any* government leasing regime that is well specified, invariant over time, and nondistorting of the decision structure of the participating firms, will assure efficient exploitation; moreover, the most efficient firm will exploit the resource.[3]

To understand this result, notice that in the certainty environment there exists no economies of scale in the spreading of risk. Therefore, the size of the firm will not influence its position in the capital market as it strives to raise the financial wherewithall to efficiently exploit the resource. The riskless discount rate will be the same for all firms and maximum rent will be extracted from the resource.

It should be recognized that the mechanism employed to extract the resource rent must be designed in such a way as to leave unchanged the decision rules of the firm. If the lease policy imposes conditions that distort the exploiting firms, then minimum cost exploitation may not be realized.

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[3]It is appropriate to observe that although the distribution of resource rent is in question until the lease award process is specified, as long as the right to exploit is *eventually* awarded to the highest bid, exploitation efficiency is assured. For example, if the government leases competitively, then the private sector resource profits will be zero and all the resource rent will accrue to the Treasury.

The western coal fields, while being comparatively easy to define using modern geological science techniques, still have significant uncertainty elements associated with their exploitation. When compared with the risk character of oil and natural gas development, the physical definability of the western coal resource is quite superior. The uncertainty that rattles the decision structure with respect to this resource is derived from the market and legal constructs that surround its operation.

The exploitation of a coal field normally dictates a four to six year lead time before the first marketable quantities are realized. Due to shortages of equipment and the sheer massiveness of capital that efficient extraction techniques require, the coal industry must plan on a rather extended horizon. This long-term planning requirement juxtapositioned with vacillating federal and state policies in a market with multiple and volatile substitutes has served to thwart the effective development of this national asset. Not to belabor this point but rather to appropriately couch the uncertainty character of this industry, it is important to observe that changing international trade policies, vacillation with respect to the Alaskan oil fields, an apparent commitment to nuclear energy development, volatile Middle East relations, and the political clout of environmental activists have all significantly hampered the development and, indeed, the basic structure of the coal mining industry. Concerning the western coal lands, continuing questions on availability of water and transportation facilities present an additional uncertainty element to the prospective developer.[4]

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[4]It is interesting to observe that the risk element facing a potential coal developer is basically an industry risk element. That is, each developer will be burdened somewhat uniformally and simultaneously by a market-related perturbation in the price of coal. Similarly, a change in air pollution

The presence of uncertainty distorts the parallelism of private and social objectives; when risk is a factor, private firms discount future revenues at a higher rate than society as a whole. Specifically, assuming risk aversity on the part of all participants, the more widely the risk is distributed the less it impacts upon the decision process. Hence, as the risk factor is permitted to impact the industry decision process, intensive development of established coal fields will result and inappropriately little attention will be given to the longer-run aspects of resource development.[5]

This troublesome uncertainty element also has significant implications with respect to the industrial organization. As the risk in an undertaking increases, it becomes increasingly difficult to obtain capital from the financial markets. Lending institutions recognize that for a given risk measure the hardship (e.g., bankruptcy) potential for a small establishment is significantly greater than for a larger firm; therefore, such institutions demand higher interest rates from smaller firms for a given project. This financial market discrimination places the smaller firm at a competitive disadvantage which encourages oligopolistic industrial structure.

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control laws will tend to impact the revenue expectations of all developers of similar sulfur content coal fields. This is a significantly different phenomenon than the more localized risk factor confronting potential oil and natural gas developers. The geologic character of risk in oil and natural gas development tends not to result in uniform dispersion of risk, but rather such risk confronts the individual firm undertaking the development responsibility. While this is an interesting observation, it does not influence the behavioral analysis since the decision making at the firm level is a strictly self-interested activity (i.e., the question is, "How much risk does my firm sustain," not, "How much risk does his firm sustain?").

[5]Alternatively, one may argue that the risk impacted discount rate in the private sector is significantly higher than the risk impacted discount rate for society as a whole; hence, the freely operating private sector produces an inappropriately intense short-run effort from a social perspective.

The above arguments suggest that leasing regimes which *transfer risk to the public sector* and/or *minimize the dependence on financial markets* would be most desirable. By transferring the risk bearing function to the public sector, we will be able to disperse it across the appropriate population and permit the relevant private discount rate to approximate the social rate of discount. Similarly, by reducing the dependence on financial markets the relative advantage of the larger firm, in its ability to disperse the remaining risk over a larger cross section, will be minimized. Such a two-pronged policy would tend to (1) remove the impact of the risk factor by transferring it to the public sector, and (2) by minimizing the dependence on financial markets further reduce the incentive for oligopolistic industrial organizational patterns.[6]

D. Summary

One question that this report addresses is how can a leasing regime be designed or evaluated in terms of their risk transfer and financial market dependence characteristics. With respect to the risk transfer component, if one ignores policies that may reduce the risk transfer component and the absolute measure of risk, then there remains only one classification of leasing regime structures that can be of assistance. Specifically, in order

[6]It should be mentioned in passing that a broader policy might be considered to reduce the impact of uncertainty on both the rate of exploitation and the industrial structure in this country. Specifically, policies aimed directly at reducing the risk factor are worthy of mention. Since most of the uncertainty arises from market perturbations, if the federal government were to institute policies to stabilize these markets, this industry would be significantly advantaged. For example, guaranteed federal loans would assist in removing this risk component and permit the industry to effectively develop this national resource. While these considerations are worthy of mention in this report, further development is beyond its scope.

to transfer the risk to the public sector, leasing regimes that impose a *conditional or contingent payment* character must be considered.[7] A conditional payment regime is one that requires monetary transfers in return for the right to develop *when* and *only if* a sequence of events are realized. Royalties, resource pledges, profit shares, and rental agreements with escape clauses are all forms of conditional payments. Similarly, lump-sum bidding procedures do not fall into this category, and this comment, together with our simplistic paradigm at the beginning of this chapter, provides a convincing argument for the importance of a qualitative analysis that recognizes the potential efficiency impact of the risk factor.

The remainder of this report employs uncertainty-relevant economic models to evaluate and suggest alternative leasing regimes. Each leasing policy reviewed in Chapter V is assessed in terms of its risk transfer character, its decision rule impact on the firm and the other design criteria developed in the intervening sections.

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[7] Notice, even though the origin of uncertainty is quite different, this result is identical to that obtained by Leland, Norgaard, and Pearson in their September 1974 report on OCS leasing. Further comment on the social desirability of such conditional payment schemes is provided in Appendix I.

Chapter IV

INTERTEMPORAL LEASING AND DILIGENT PRODUCTION CLAUSES

A. Executive Summary

In this chapter the topics of leasing over time and diligent production requirements are addressed. The major conclusions of interest are listed below.

*Misinterpretation of the criterion of obtaining a "fair market value" for a lease can lead to too slow development of our nation's coal resource. The tendency of the government to exercise its inherent monopoly power should be avoided.

*A desirable framework for leasing would include industry nomination of tracts within a geographic area which has received prior administrative approval. Bureau of Land Management initiated tract nominations are unlikely to be as efficient as private industry. This arrangement will allow, through administrative review, the adjudication of competing interests.

*Diligent production requirements can achieve greater current production at the expense of lower total production from a given lease. They do, however, permit the government to retain greater control over future uses of the land. These benefits of greater control must be carefully weighed against the costs of lower production and revenues from leasing.

*The concentration of leases is less than the concentration of mining companies in the West, which indicates that the leasing program has not favored the larger firms.

In the preceding section of this report the features of alternative leasing schemes were examined in regard to their effects on certain stated goals. The discussion ignored, for the most part, the difficult questions of how much leasing should be done at a given time, or under what constraints any leasing should be performed. That is, should a certain level of production be required in every period, or what considerations should be given to alternative usages of the resources? The answers to questions such as these will, to a large extent, determine the feasible levels which can be set as leasing objectives, and therefore impinge directly upon the determination of the optimal leasing arrangement. Our focus shall continue to be on considerations which should influence the design of a program for future leasing.

In a world of perfect foresight the presence of competitive behavior on the part of coal producing firms would assure that certain socially desirable results would be obtained. In particular, as discussed in Chapter III above, the policy of disposing of the federal lands in a single sale would result in an efficient distribution of production over time. Those parcels of land which were the easiest to exploit would be used first, and other parcels would come on line as the net price of coal rose over time.[1] Furthermore, the lands would be auctioned off to the most efficient firms, and the Treasury would receive the "fair market value" for the lands. Since these preconditions do not even remotely obtain in reality, the government must deal with the issue of determining the optimal rate of leasing. In a broad sense the fundamental choice is between being a passive respondent to *current* economic conditions

[1] See W. D. Nordhaus, "The Allocation of Energy Resources," *Brookings Papers on Economic Activity*, 3: 1973, pp. 529-570, or R. M. Solow, "The Economics of Resources or the Resources of Economics," *American Economic Review*. Vol. LXIV, May 1974, pp. 1-14, for a discussion of the intertemporal efficiency conditions which would arise in a world of perfect foresight and competition.

as in industry nomination of tracts to be leased, or to be an active participant, which may include the decision of no leasing at all. The desirability of these two courses of action is critically determined by the institutional arrangement chosen, including the information requirements necessary under each. We shall consider the two cases separately.

B. Industry Determined Leasing

Under a policy of industry nomination of leasing areas, both the size and location of coal leases would be determined by firms in the industry. This approach to leasing would generally result in a dynamically *efficient* production[2] path being chosen in that, under the assumption of competitive behavior under uncertainty, firms will bid for the resource up to the point at which the additional value of expected future profits were zero. Although the output stream would be efficient, there is no assurance that it would be optimal; that is, that it would in any sense maximize the welfare of society. In particular, it can be argued that in the presence of uncertainty, a risk-adverse firm will evaluate projects with a discount factor which incorporates the returns to risk. Calculations based upon this figure will result in production plans which are biased towards the present.[3]

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[2]The term efficient production is used here to mean that no path of output, x_t^j, $t = 1,2. \ . \ .$, would be chosen such that for some time period t, $x_t^i > x_t^j$, and $x_{t'}^i \geq x_{t'}^j$, $t' \neq t$. In other words, the set of all possible efficient production paths involves only those paths in which to have more coal output today implies that there must be less at some other time.

[3]Although this argument is formally correct, the fact that the Department of the Interior uses a real discount rate of 12-20 percent to evaluate future benefits reduces the magnitude of the distortions due to the use by private companies of a discount factor which includes a risk premium. The 12-20 percent figure is quoted in *Federal Leasing and Disposal Policies*, Hearings before the Committee on Interior and Insular Affairs, U.S. Senate, June 19, 1972, p. 243.

Apart from this effect on the time profile of production, the use of an industry nomination system will have additional drawbacks. Due to the legal framework in which leases on public lands are granted, a private firm has no incentive to consider the total usage of the resource. Since the lease entitles the user only to the mineral rights, the behavior of a firm is dictated by profit considerations from the mineral. Alternative uses, both in the current period and in subsequent periods are neglected. Given the fact that the ownership rights are divorced between surface and subsurface, the natural result is a constant friction between the affected parties. (At the current time an obvious example is the dispute between agricultural and mining interests in the restorability of the surface after strip mining. This issue is particularly important in the semi-arid western states.) These frictions would only be exaggerated under a policy of industry nomination since the private decision calculus which is based strictly on the mineral right does not result in the evaluation of alternative uses of the land.

It is, of course, true that this problem would be eliminated if a firm could own all the rights, mineral and non-mineral, surface and subsurface, to land. Such a solution would require a large change in the current laws as well as a change in the political attitude towards federal land disposal, and thus we will not seriously entertain it.

In the same manner that industry nomination would result in the ignoring of alternative uses of the land, both in the current period and after the mining is over, so too would it ignore environmental considerations.[4] It would only be by the remotest of coincidences if the geographical distribution

[4]We are ignoring for the moment the fact that the government can impose certain environmental restrictions. This, of course, is an element of either an aggressive government leasing policy, or of a combination of aggressive with some industry nomination.

of coal deposits were located such as to minimize environmental damage and the value of alternative uses of the land. Given the conditions under which coal was formed, the converse appears closer to the mark, and thus one would expect that a policy of industry nomination of tracts would be detrimental to the environment. The current haphazard maze of site leases bears testimony to the land use pattern which can emerge under industry nomination.

C. Government Determined Leasing

If the determination of lease location, size, and timing is considered to be an essential part of government action, then there are several problems which must be specifically addressed if a rational leasing policy is to be obtained. An essential first step is to recognize the potential monopoly power of the federal government. At the current time federal lands located in the West contain about forty percent of the known coal reserves of this country, and to a large extent, this coal is cleaner in use than eastern coal.[5] However, in 1970 less than two percent of the nation's coal production came from federally owned lands. This proportion can reasonably be expected to rise in the future, and consequently, although the record of the government exercise of monopoly power may have been non-existent, the possibility of its occurrence in the future should not be ignored. Given that a policy of sequential leasing of federal lands is the choice of the government, then a socially optimal leasing policy must take considerable care not to lease too slowly (due to monopolistic tendencies). The slow leasing of coal lands will result in higher prices for coal, and hence an inappropriate substitution towards alternative energy sources.

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[5]These figures were given by Harrison Loesch, then Assistant Secretary of Public Land Management, U.S. Department of the Interior, in testimony to the Committee for Interior and Insular Affairs, U.S. Senate, *op. cit.*, p. 36.

The potential for the monopoly power of the government being exercised is significant since a stated goal of U.S. leasing policy is to obtain a "fair market value" for the resources held in public trust.[6] The term "fair market value" suffers from a public misinterpretation that "more revenue is better"; consequently, government officials charged with administering a land leasing program are in the position of being accused of selling out to industry or giving the nation's resources away if they attempt to *not* use their monopoly power.

Since the "benefits" of exercising the government's monopoly power are easily seen in terms of increased revenues and reduced public criticism, and the costs are not very visible, there is an understandable, but misguided, tendency to err on the side of too slow leasing. This tussle between the goals of minimum revenue and inter-governmental equity is further compounded since the world is not one of certainty about future events, and decisions to bid for leases are made *ex ante*, not *ex post*.[7]

In contrast to the situation under industry nomination, there is no reason to presume productive efficiency upon the part of the government in the choosing of sites to be leased. The choosing of sites for leasing has several implications: first, a decision, implicit or explicit, has been made

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[6] See Committee on Interior and Insular Affairs, U.S. Senate, *op. cit.*, p. 36, for a statement of the goal of the government in resource leasing. The goal of obtaining fair market value is stated explicitly therein.

[7] The problem which arises under uncertainty is that a firm would pay a price for a federal lease that is at most equal to its expected gain. Thus, if a particular tract of land had a potential value of $100 million or $10 million, each of which were equally likely to obtain, then the most a risk neutral firm would offer for the land would be $55 million. In times when coal is considered to be particularly valuable, charges will be made that a "wind-fall profit" of $45 million will have been given to the industry by the government. If firms in general are risk adverse, then the magnitude of "wind-fall profits" would be even greater.

concerning the alternative uses of the land; second, it implies that the optimal lease strategy over time has been developed. That is, a socially optimal policy requires that lands be leased in the order in which their totoal production costs are ranked;[8] to do otherwise would be to produce a suboptimal production path over time. The ability of the federal government to make all of these decisions is at least a debatable point, since the information requirements necessary to determine the optimal leasing sequence alone are enormous. Taken literally, it would entail the computation of expected incremental production costs for all possible lease sites. This effort would in effect subsidize the mining industry for the risk incurred in exploration. However, since the dominant source of risk in the bituminous coal industry is market risk due to fluctuating prices rather than exploration risk, the benefits of this subsidy appear small.

Hence, either a policy of sole reliance upon industry nomination or absolute government determination would appear to be unjustifiable. The argument against industry nomination is based primarily upon the complex property right issues involved, which do not lend themselves well to private solution. Government nomination, while it can solve the problem in principle, is unlikely to work in practice due to the large informational demands. A desirable combination of these two is the policy of industry nomination of tracts, with government approval necessary before a lease is issued.[9]

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[8]Strictly speaking, the statement holds only for a given type of coal. An analogous condition holds for multiple types of coal.

[9]It is not implied here that the government will have an easy job of adjucidating competing claims of externalities; we only maintain that government review would be better than no consideration.

In practice, the only feasible way that this can be performed is on a large geographic basis. That is, since the government's review process is in essence a zoning decision, it would be impractical to carry out on a lease by lease basis. Administrative approval should be given or denied to an entire area and have the nomination of leases within this area left up to the industry. This would in effect consolidate the information required to comply with NEPA, and to determine the fair market value.

Given that administrative review is exercised over the selection of leasing sites, there remains the determination of the *rate* of coal land leasing. Specifically, the question is now and to what extent should the federal leasing program be responsive to market force. Previous federal policy has basically been one of accommidating the demands of industry, subject to the requirements of the mining laws. This policy, it is often alleged, has led to an *excessive* rate of leasing, since the percentage of leased tracts actually in production has been quite low—two-thirds of the tracts leased have not yet resulted in any output. As argued above, the speculative holding of federal coal leases, whether excessive or not, was due to the character of the leasing system, and not directly related to the amount of leasing. Under a competitive leasing scheme with a policy of risk sharing between firms and government, this feature of the leasing program will be reduced substantially. Arguments concerning the amount of leasing to undertake should not then be based upon the desirability or undesirability of speculation, since speculation depends upon the lease structure, not the amount of leasing.

If one assumes that private firms use a discount rate in their calculations which exceeds the social rate of discount, then there will be a less than desirable amount of coal produced, and the pattern of production will

be biased towards the present. The reason for this is again due to the effects upon the decisions of the firm. Since the rate of return on assets of equivalent risk must be equal, it follows that the return from owning coal lease, whether in terms of current dividends or capital gains, must equal the private market rate of interest. Assuming that the industry is reasonably competitive, the price of coal, p, would be given as:

$$p(t) = c + x(t)$$

where c is the *production* cost of a unit of coal, and includes labor costs, capital costs, etc., and x(t) is the quasi-rent which is earned. (The assumption of non-competitive industry behavior will not change the point we are making.) That is, x(t) represents the return to the owner of the coal resource, and it constitutes his payment for mining it at time t. To be indifferent between producing more coal in the current period, and, thus, earning a return of rx(t), where r is the rate of interest, it follows that the price of coal resource must be expected to rise at the rate[10]

$$\frac{\dot{p}}{p} = \frac{\dot{c}}{p} + \frac{\dot{x}}{p} = \frac{\dot{c}}{p} + \frac{rx}{p}$$

The rate at which coal prices are expected to rise is composed of two elements. The term rx represents a scarcity payment to the firm which is earned by *not* producing an additional unit of coal today. This scarcity payment is a feature which characterizes all non-replenishable (i.e., those

[10] To see this, note that the change in the price of coal, $\dot{p}$, is equal to $\dot{c} + \dot{x}$. However, $\dot{x} = rx$, and therefore:

$$\frac{\dot{p}}{p} = \frac{\dot{c}}{p} + \frac{rx}{p}$$

which are given by nature in a fixed amount) resources. When a firm buys an asset such as a coal lease or a coal mine, it buys an asset which is in the ground, and which does not earn any revenue. Since the firm could just as well have invested its money elsehwere, and made a return per unit of r percent, to be indifferent between producing an extra unit today or tomorrow implies that the expected rate of price increase, $\frac{\dot{p}}{p}$, be equal to the interest rate, r, times the share of quasi-rents in the market price of coal, $\frac{x}{p}$, plus the expected change in production costs, $\frac{\dot{c}}{p}$. As long as there are costs to producing coal, then the market price reflects both production and rent aspects and the change in the market price will be the net effect of these two forces. Historically, extraction costs in real terms have declined due to technological change in mining, but ultimately a limit on their fall is necessary. As long as the market rate of interest which includes a risk premium is used in private decision making, there will be a tilting of the production time profile towards the current period.

These considerations suggest that since the cost of extraction of coal will be related to the amount of reserves available, for a given level of technology, a major impact of the federal government can be had through its leasing policy. Specifically, the thrust of leasing policy should be to lessen the effects of private decision-making which discounts the future too heavily. That is, since the effect of market risk is a decreased utilization of coal resources, in particular the adoption of production patterns which are excessively weighted towards the present, society in general would be willing to pay a premium to avoid this. This can be achieved by adopting a leasing policy that is counter-cyclical. That is, the amount of acreage leased in a given period should respond to the current market price of

coal.[11] Excessive swings in the price of coal will, therefore, be reduced. It should be noted that although the current impact of such a program by the government is likely to be small, as the percentage output from federal lands increases, the effect on the market price will become proportionately larger. Since a primary source of uncertainty is federal regulation of alternative energy sources, this point is further reinforced.

D. The Role of Diligence Requirements

It has often been alleged that under previous leasing practices a significant amount of land is merely held for speculation. For example, as of January 30, 1972, there were 530 coal leases of 780,712 acres of which only seventy-nine leases (9.4 percent) were producing.[12] Although economists would in general argue that speculation per se is beneficial as a market stabilizing force, examples of unused coal leases of ten to twenty-five years stretches the creditibility of this argument.[13] Very little information is available concerning why leases were withheld from production for so long. Was the acreage leased unprofitable at any of the past prices for coal—due, say to remoteness from transportation, or is it being held entirely for speculative purposes. This is a topic about which little is known, and there is a clear need for additional research. It is important to review the arguments in favor of and against the imposition of some form of diligent production requirements.

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[11] Authority for this exists under the Mineral Act of 1920. See 55ID Interim Dept. 13 (1934).

[12] Committee on Interior and Insular Affairs, *op. cit.*, p. 205.

[13] The compilation of lease information in pages 36 to 47 of *Leased and Lost: A Study of Public and Indian Coal Leasing in the West*, Council on Economic Priorities, (New York, 1974), indicates that there are some leases granted as long ago as 1950 and 1952 under competitive leasing which have not yet produced any output.

The major argument against production requirements is that they force what may be inefficient production time schedule upon a firm. That is, since the geological conditions of coal sites differ, the efficient production patterns from each will in general be different. The motivation for this argument is that diligence requirements will in some way increase production. This increased production occurs only in a given period or periods, and can be purchased only at the expense of other periods and of the total amount of production. A second argument against the use of production requirements is that they discourage speculative development of coal leases and, since speculation reduces price fluctuations, its absence will increase the riskiness associated with coal mining. A third argument which can be made is that to the extent that production requirements diverge from what a competitive firm would choose to do, then the bid for a lease will be lower, and hence so will the return to the treasury.

The alternative viewpoint, that production requirements be required, has largely been argued on the grounds of equity; that is, there is a belief that "wind-fall" profits accrue to speculators who have had to pay a very low cost for holding the lease inactive. Despite the widespread view that exorbitant returns to speculators exists, there appears to be little evidence to support this. Furthermore, even if "wind-fall" profits do exist, diligent production requirements are not a desirable way to reduce them.

A more forceful argument can be made for diligence requirements, however, based upon the uncertainty of future technology and the peculiar character of mineral leases. Under the present system of leasing, the discovery of reserves recoverable with current technology will elicit a bid under competitive auction as long as there is some probability that the coal can be extracted profitably.

This probably might be very small, or else the date at which it will be used may be remote and hence the bid will be low. Either the bid is accepted or the government must justify refusing it. If a lease is granted, however, then the leasee has rights only to the minerals. If at a subsequent date an alternative use of the land becomes more valuable then the production of coal, there is no direct mechanism by which this changed relative valuation can impact the system. In general, one would feel more comfortable predicting alternative uses in the near future rather than the more distant. Consequently, some form of specific diligent development clause similar to that contained in the Outer Continental Shelf Oil and Gas leases[14] would seem desirable, *given* that fundamental changes in the mineral rights on a lease are not contemplated. In this regard, diligence clauses are one way, albeit not the best, to insure efficient land use.

An additional reason for regarding the imposition of diligence requirements to be desirable is that from the standpoint of risk-bearing in the energy field, the federal government is better able to diversity itself than private companies, subject, of course, to no radical change in the anti-trust laws. The major source of market risk in coal has been competition from other fuel sources, which has usually been encouraged by government policy. In effect, the government through its enforcement of various laws has been a major source of uncertainty. To some extent there is diversification in the energy field in that major oil companies own significant coal reserves, but the further extent of this diversification seems limited given the prevailing opinions on monopolistic practices. Thus, it may be more efficient to have the government bear risk in this area. In addition, if a counter-cylical

[14]The Outer Continental Sheld leases stipulate that production begins within five years.

leasing policy is followed, the federal government is already bearing risk, and hence should reap the rewards.

Finally, the use of diligence requirements can be justified as an alternative to large front-end capital requirements as part of an overall leasing strategy. In the following chapter of this study, attention is focused upon the relative desirability of contingent versus non-conteingent leasing strategies. In general, contingent payment schemes share risk, while non-contingent methods do not. However, the greater the amount of risk that is transferred from the private to the public sector, the greater the likelihood that private behavior (i.e., production decisions) will be affected. This problem, known as *moral hazard*, is well known in the fields of health and automobile insurance.[15] In the case at hand, a leasing policy which stipulated that a certain percentage, which is to be determined by competitive bidding, of revenues be returned to the public sector incurs the risk that under a competitive auction the percentage bid will be too high, since production and payment must be made only in favorable states of nature. That is, since the individual firm retains the right to make production decisions, there is an inherent problem of speculative behavior in contingent leases. To rectify this, diligent production requirements or bonus bids can be employed.

There is no clear-cut solution to the problem of diligence requirements. On the one hand, the potentially valuable role of speculation to stabilize market prices cannot be denied. Alternatively, the use of diligence

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[15]The term "moral hazard" refers to the fact that individuals who are fully insured are likely to be less careful in their driving, or more diligent in their reporting of damages. Similarly, full health insurance results in a greater frequency of medical visits.

requirements has the advantage of preserving societal options until more information is at hand. Fundamentally, the choice open to the government in imposing stricter diligence requirements is to have greater control over the future use of leased lands at the expense of lower total amount of production, and a lower eventual return to the Treasury. In general, the desirability of diligent production clauses is critically dependent upon the type of leasing scheme selected.

E. Industrial Structure and Coal Leasing

A common complaint about the history of federal coal land is that it has in some way favored large firms over small, and that this has resulted in monopolistic or oligopolistic behavior on the part of the industry. For example, a recent study of the Council on Economic Priorities, reported a breakdown of 474 leases and acreage from federal and Indian lands for the seven western states—Montana, North Dakota, Wyoming, Colorado, Utah, New Mexico, and Arizona—in which the ownership of leases was reported by the parent company (Table 4.1). Significant attention was drawn to the fact that the top fifteen leasholders control seventy percent of the acreage leased, (only forty-nine percent of the individual leases). As an indictment against previous leasing policies, this figure sounds alarming, but it requires some basis for comparison. The measure of industrial concentration which is commonly accepted as being indicative of industry structure is the precent of output accounted for by the four or eight largest firms. For a commodity such as coal, these ratios would, of course, have to pertain to a given geographic area. In Table 4.2 the concentration ratios for the four largest firms are given for the three major coal producing regions—Appalachia, Eastern Interior, and Western-Western Interior for the years 1950, 1960, and 1970. It is readily

Table 4.1

Company	Leases	Acreage
1. Kennecott Copper	53	179,524
2. ElPaso Natural Gas	16	67,298
3. Continental Oil Company	35	63,298
4. Utah International	27	55,638
5. Pacific Power and Light	20	43,830
6. Lincoln Corporation	27	43,345
7. Arizona Public Service and San Diego Gas and Electric	21	40,911
8. Westmoreland Coal, *et.al.*	1	30,876
9. Shell Oil Company	1	30,247
10. Sun Oil Company	2	21,240
11. Richard Boss	1	20,700
12. Gulf Oil	9	20,587
13. American Metals Climax	3	20,196
14. United States Steel	20	19,792
15. Atlantic Richfield	6	19,141

Source: Economic Priorities Report, *Leased and Lost*, p. 10.

Table 4.2

Four-Firm Concentration Ratio for the Coal Industry, by Firm and Region, 1950, 1960, and 1970*
(Percent of Market)

Region and Firm	1950	1960	1970
Appalachian			
Consolidation	8.7	11.7	15.5
Island Creek	3.0	4.9	5.9
Pittston	-	5.3	5.7
U.S. Steel (c)	7.2	6.7	5.0
Eastern Association	3.6	-	-
Sum—Top Four	22.5	28.6	32.1
Number of Firms	(288)	(258)	(307)
Eastern Interior			
Peabody	13.4	27.5	38.7
Ayrshire	-	7.4	10.7
Old Ben	4.9	-	8.2
Freeman-General Dynamics	-	7.9	10.4
W. Kentucky-Island Creek	5.1	8.0	-
N. Illinois	5.1	-	-
Sum—Top Four	28.5	50.8	68.0
Number of Firms	(70)	(33)	(24)
Western-Western Interior			
Peabody	-	14.7	19.9
Utah	-	-	15.1
Pittsburgh and Midway	-	7.6	6.8
Kaiser (c)	7.5	-	5.8
Truax-Consolidated	-	6.8	-
U.S. Steel (c)	-	9.5	-
Bevier	10.0	-	-
Union Pacific RR (c)	15.0	-	-
Northern Pacific RR (c)	8.6	-	-
Sum—Top Four	41.1	38.6	47.6
Number of Firms	(36)	(32)	(28)

Source: *U.S. Coal Production by Company*, McGraw-Hill, various years.

Note: (c) indicates captive producer according to McGraw-Hill sources.

*Market share calculated by excluding all firms with less than 100,000 tons annual production.

apparent that concentration, as measured by the top four firm's market share, has been increasing over time in all three regions. This increase is due to several factors, of which the increased scale of operations brought about by technological change, particularly in strip mining, and the changing character of the market, which reflects the increasing relative demands of utilities, are prime examples. The breakdown by region in 1970 is particularly interesting; the percent of output accounted for by the four largest firms was 32.1 in Appalachia, 68.0 in the Eastern Interior, and 47.6 percent in the west. By way of comparison, the four largest leaseholders on federal lands controlled only 27.6 percent of the leases and thirty-nine percent of the acreage. Although this evidence is not beyond reproach, it does indicate that the federal leasing program has not been excessively oriented toward large firms. If anything, the evidence points the other way.

In terms of future prospects for industry concentration, it seems likely that concentration will increase, as happened in the Eastern Interior, with the increased demand for electricity generated by coal. This tendency will be more pronounced if the movement to mine-mouth plants continues as predicted.

Recognizing that the concentration of the bituminous coal industry in the west is likely to increase, what can or should be done through the federal leasing program? One obvious route would be to reduce the maximum acreage per state or introduce an overall maximum acreage restriction. This would unquestionably require congressional authorization. The second option would be to tailor the terms of leases such that small firms are to receive additional considerations. For a variety of reasons, which we discussed in Chapter V, this is not a desirable option, given the stated goals of the leasing program. Indeed, it is like asking David to slay Goliath with an empty sling. If

industry concentration is thought to seriously undermine the nation's energy goals, a far better means to deal with the problem is to press for action under existing anti-trust laws.

F. Summary

This section has been concerned with considerations which would affect the rate of leasing of federal coal lands. It has been argued that in the presence of uncertainty and externalities a general policy of industry determination of leases would not lead to desirable results. In particular, the presence of uncertainty would lead a competitive extractive industry to tilt its production profile toward the present which would cause an undesirable allocation of coal production over time. Given the nature of property rights contained in a coal lease, it was further argued that the exploration and production of coal would be unlikely to respect certain non-market values. The conclusions reached were essentially that due to the informational efficiency of the private sector, tracts should be nominated by firms and leases distributed subject to administrative review. It was also argued that the appropriate rate of leasing should have the goal of reducing market uncertainty to the industry. In this manner, the bias in production due to the difference between private and social discount factors could be minimized.

Secondly, the desirability of diligent production requirements was examined. Although the potential price stabilizing effects of speculation were noted as an argument against diligent production clauses, the benefits of diligence clauses were seen to lie in the ability of these clauses to reduce the occurrence of undesirable behavior (moral hazard) under some leasing strategies, and to provide some control for a directed federal leasing program over future alternative uses of the land. These arguments were made

in the context that no fundamental change in federal policy would occur which would allow complete ownership of the surface and subsurface rights.

Finally, the industrial structure was examined, and a comparison with deconcentration among leaseholders was made. The evidence did not indicate that federal leases were dominated excessively by large firms (relative to the industry), and indeed, the opposite seemed more likely.

Chapter V

ALTERNATIVE LEASING SCENARIOS

A. Executive Summary

This section examines several alternative leasing arrangements which reflect the general principles previously discussed. The goal is not to choose the "best" leasing scheme, but rather to set forth a menu of choices which represent different measures of government risk-sharing, administrative costs, and likely legal feasibility. The scenarios listed, while not exhaustive of all possibilities, represents a sufficiently broad spectrum so that refinements and/or extensions of these schemes may be considered by combinations of those listed.

The major conclusions of interest are listed below.

*Many of the alleged problems with the past leasing program (e.g., unfair return to the treasury) can be attributed to the type of market established, not to the leasing itself. In particular, the practice of allowing oral sealed bidding, and the allowing of a sale where fewer than three firms were represented, put the Federal Government at a disadvantage.

*A well-designed leasing program must employ contingent payment methods (such as royalty payment) as well as non-contingent payment methods (such as bonus bids).

*Despite the fact that bonus bidding creates disadvantages for smaller firms, it does minimize excessive speculation in lease bidding.

A discussion of the economic effects of alternative leasing strategies can be appreciated best by reference to past leasing practice. Past leasing practice can be thought of as having two elements: (a) setting the structure

for a leasing market, and (b) determining a leasing structure. Upon examination, it becomes clear that dissatisfaction with the results of past leasing can be traced mainly to the failure of adequately structuring a competitive market for leases with only a partial responsibility due to the terms of the leases. As argued in Chapter III, a competitive market for leases is essential if the goals of the program are to be attained, and thus it is desirable that those practices which prevented a competitive market be eliminated. The elements of previous practice which have caused substantial problems are: the technique of bidding used, the number of firms in the market, and the selection of tracts to be leased. Since each of these issues pertain in a different way to preference right leases, a topic which we discuss separately, our comments will be directed only to competitive leases.

Previous practice often, although not always, has been to allow both sealed and oral bids, with the oral bids following the opening of the sealed bids. This practice encourages firms to submit very low sealed bids since they can bid higher in the oral bidding, if necessary. As long as the number of competitors at an auction varies, firms will not reveal the amount they are willing to pay for a given lease. Consequently, the return to the treasury is reduced. Extreme examples of the consequences of this practice exist: in twenty-four lease sales no bid was received, and the firms which nominated the tract received the lease. It is clear that this procedure of bidding should be replaced with a "sealed bids only" method; if a site is vaulable enough to be nominated for leasing, it surely must command a positive price.

An essential element in establishing a competitive market is that there will be a significant number of interested parties in order to prevent "gaming" situations—i.e., where a firm makes its bid not on the value of the lease, but on what it thinks others will bid. It is not possible to say

exactly "how many" parties is necessary to make the market competitive, but it is assuredly greater than one, two, or three bidders. Evidence that the average bid per acre increases with the number of participants is given in the report by the Council of Economic Priorities referred to earlier. To some extent, the problems with a small number of bidders will be reduced by the use of a sealed bid method, but a definite lower limit, say four, should be established. It is important to recall that a competitive lease is for land which is *known to have coal in workable quantities.*

The problems which were addressed in the two previous points are complemented in the determination of site leasing. Under previous practice, an application by a single interested party was sufficient to have a tract of land set up for leasing. This practice has the inherent disadvantage that the individual nominating the tract may have a competitive advantage in terms of knowledge of the site. Although industry nomination of sites is indispensible in any leasing program, administrative review is also essential. Such review will, of course, allow the government to reduce the checkerboard pattern of leasing which prevailed previously, and with proper information dispersal will ensure that a sufficient number of participants are attracted. These revisions are essential then for attaining goals of a federal coal land leasing program since they provide or help to provide, the conditions of a competitive market for leases. The remaining institutional arrangement which affects the establishment of a competitive market is the division of leases between competitive and preference right.

As discussed in Chapter II, there exists authority for two types of leases—competitive and preference right. On federal lands in which coal is known to be present in workable quantities, only competitive leases can be

issued. On those lands for which no known deposits exist, an individual or firm may apply for the right to prospect for coal, and if a commercial discovery is made, the prospector is legally *entitled* to a preference right lease. In principle, a preference right lease structure can be coupled to the types of leasing arrangements we suggest below, and can achieve any given result that a competitive leasing structure can. In previous practice, however, the preference right leasing structure has resulted in excessive speculation. That is, given the division between surface and subsurface rights, and the low rental charges in the lease, the discovery of an amount of coal which satisfied the definition of workable, even if the probability of the tract actually being worked were low, would result in the preference right lease option being exercised. The central problem here, apart from the division of surface and subsurface rights, is that the preference right lease structure, as it was used in the past, did not adequately charge the speculator for his actions.

Assuming that the preference leasing system is coupled to a competitive leasing strategy such as discussed below, (which would imply that some type of bidding method be devised for allocating prospecting permits rather than the first-come, first-served approach) the only economic difference between a preference lease and a competitive lease would be centered on who bears the risk of exploration. Although the topic of exploration risk is outside the scope of this work, an argument can certainly be made that the Federal Government, through the U.S. Geological Survey, is well equipped to perform the exploration, and that the government is best able to bear the risk.

In view of the capability of the Geological Survey and recognizing the fact that known coal reserves are quite substantial, there does not appear to be any compelling reason why preference right leases should continue to be

issued. If at some future time, it is deemed desirable to prospect for coal, then the difficulties in obtaining a fair market value of coal from the preference right system argues for an alternative such as federally sponsored prospecting contracts.

The types of alternative leasing arrangements which we consider here can be divided into two classes: contingent and noncontingent payment schemes. As the terminology indicates, certain schemes require payment conditional on what events transpire in the future, while others require payment regardless. For example, a bonus bid is a noncontingent payment scheme since payment of the bid amount must be paid regardless of the amount of coal found, or the price at which it can be sold. A royalty payment is a contingent payment since it must be paid only if output is produced. In general, contingent payment schemes spread risk while noncontingent payment plans do not. However, an optimal leasing scheme in the presence of uncertainty will embody both contingent and noncontingent elements in order to achieve risk-sharing without substantially reducing the incentives to production; hence, only mixed structures are reviewed.

The leasing scenarios considered can be divided into four categories:

a. royalty payments

b. rental payments

c. profit sharing

d. coal pledges

Within this classification, there are several variations which are of interest due to their differing economic implications. Since current law requires both royalties *and* rentals, the following variations are best considered collectively.

B. Royalty Payment Leases

A royalty payment requires payment of a certain value per ton of coal. The type of royalty payment may either be fixed in dollar terms, as in past coal leasing practice, or a specified fraction of the value of production from a lease, as is the practice of Outer Continental Shelf leases and recent coal leases. These two types of royalties have different effects, and therefore we distinguish between them.

1a. Fixed Percentage Royalty with Bonus Bidding

In this scheme the royalty rate is fixed, and firms compete for leases by the amount of bonus bids which they are willing to pay. This approach has the advantage that the higher the royalty payment is set, the higher on average will be the returns to the Treasury since the government is bearing greater risk, and the lower will be the amount of lump-sum bid, which will reduce the financial benefits of firm size. Usually, the most efficient firm will obtain the lease.

The major disadvantage of this type of royalty payment is its tendency to distort the relationship between marginal cost and price. In essence, a royalty payment is like a tax, and thus the effect will be to reduce the level of production from a given coal field. In the limit, if the royalty schedule were set too high, there would be no bids forthcoming. The exact amount by which coal recovery will be reduced is not known, and it would seem desirable to have an estimate of the likely impact before choosing a given royalty rate.

Under recent practice, royalties are fixed as a percentage of the value of the production of the deposit. This appears to meet statutory requirements so long as the prescribed five cents per ton minimum is observed. Bonus bidding on a fixed royalty lease is the mode most likely contemplated by the statute.

1b. Fixed Absolute Royalty with Bonus Bidding

In this scheme the lease terms stipulate a fixed amount of money to be paid per ton of coal produced, and firms bid a lump-sum amount for the lease. Again, it should be noted that the fixed royalty must be set at above five cents per ton in order to comply with the current statute. This scheme shares the features of the previous one, except that the government's return for risk-sharing is greatly reduced. That is, the public sector only receives its royalty when the situation is favorable, but the return does not increase as market value increases. In essence, the role of the public sector is one of providing insurance, but with very little compensation.

The disadvantages of this leasing scheme are similar to those of the percentage royalty except that the distortions to the production decision are likely to be reduced in terms of the early shutdown of a coal field. That is, the effect of a given money payment becomes proportionately less the higher the market price. On the other hand, the use of fixed money royalty will reduce the incentive to produce when price is low, and therefore may cause some fields not to be developed.[1]

2a. Fixed Bonus Payment with Percent Royalty Bidding

This scheme results in a fixed sum of money required regardless of the eventual production from the land, and bidding is on the percent royalty

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[1] To see this, note that under the two royalty scheme profits, π, would be given as:

a. (fixed percentage) $\pi_1 = P\,(1-t)\,Q - C(Q)$
b. (fixed money amount) $\pi_2 = (P - M)\,Q - C(Q)$

where P is the price of coal, Q is quantity, C(Q) is the total cost schedule, t is the percentage royalty, and M is the stipulated money royalty. For sufficiently high prices, $P > \frac{M}{t}$, marginal revenue will be higher in the case of a fixed money amount, and therefore production will be greater. For lower prices, $P < \frac{M}{t}$, production will be greater under the fixed percentage scheme.

to be paid. For a given state of knowledge, the lower the required lump-sum payment, the higher will be the winning royalty bid. This arrangement has the advantage of being potentially able to share risk between the private firm and the public sector to any degree. There is a potential danger of moral hazard in this leasing arrangement, however. That is, the lower the lump-sum payment, the greater the spur to competitive behavior, and the greater the bid royalty will be. A low front-end payment, however, reduces the cost of speculation, and hence there is an incentive to bid wildly since royalty payments have to be made only at the option of the firm—that is, if and only if production occurs. Hence, it is possible that the most efficient firm will not win the lease since there is no restraint on the royalty bid. This speculative behavior could be minimized by a larger lump-sum payment. In addition, diligent production requirements could be employed to minimize this speculative behavior.

The basis in law for this method is somewhat murky. A lump-sum payment is not specifically provided for by the Leasing Act but references to "qualified applicant" or "by such other methods as he may by general regulations adopt" may be sufficient to allow the Secretary to adopt a fixed lump-sum payment as a prerequisite to issuance of the lease.

Royalty bidding presents a greater problem. The statute requires royalties to be fixed prior to the offering of the lease. Accordingly, it is reasonable to argue that the competitive bid procedure mentioned in the statute is not intended to override the fixed royalty requirement. Two interpretations are possible, however. One is that royalty bidding is forbidden, that only lump-sum bids can be used; the other is that the royalty can be set (at or near the minimum) and the bidding can occur on a "surplus royalty." Considering

the broad language of the statute, it is reasonable to proceed under the second interpretation, though clarifying legislation or regulations would be a more clear and permanent solution.

Production must proceed under the "continuous operation" provision, however, in practical effect this lease provision cannot bring about such production but merely allow, through court action, the cancellation of such lease or a possible damage suit.

2b. Fixed Bonus Payment with Absolute Royalty Payment Bidding

This scheme requires a predetermined amount of money payment, plus a royalty payment which is stipulated in dollars per ton. As such, it shares the features of 2a, except that it will, in general, not have as great an effect on the early shut-down decision of a coal field.

3. Summary of Royalty Schemes

The two basic royalty payments plans outlined above represent different methods in which the public sector can accept a portion of the risk inherent in coal leasing. The basic effect of a royalty scheme is that the government becomes a "partner" in the lease, in the sense that payment is contingent upon the turn of events in the market for coal. The major disadvantage of a royalty payment plan is that it will lead to early shutdown of a coal field. Moreover, if the royalty rate is constant across all fields, then it is likely that some coal deposits will not be developed. Apart from these disadvantages, a royalty payment system has the advantage that it is flexible, and can be easily administered. If a royalty payment scheme is to be employed in federal coal leasing, we suggest:

a. A percentage royalty and not a fixed money sum per ton be used. A percentage royalty will allow the public sector to share in the risk, with less production distortion than the fixed money sum basis.

b. The major disadvantage of a royalty scheme is that it encourages suboptimal development of a field. To reduce this it would be desriable to incorporate a royalty schedule which declines with cumulative production.

c. If a royalty scheme is to be used, then a fixed percentage royalty payment with lump-sum bidding appears best. This scheme has less likelihood of encouraging undesirable types of speculative behavior. However, the size of the winning lump-sum bid which would be generated may be large, and thus, put smaller firms at a disadvantage.

C. Rental Payment Leases

A rental payment lease structure is one in which a given amount of money is paid per acre of land per unit of time. The type of payment may be, as in the case of royalties, either a percentage of value, or a fixed sum. The risk-sharing characteristics of each are somewhat different, so they will be distinguished.

1a. Fixed Percentage Rental with Bonus Bidding

This scheme would have the annual rental per acre of land set at some fraction of the current market value of the land (i.e., a percentage of alternative use), and the lease would be awarded to the highest lump-sum bid. If a firm fails to meet the rental payments, then the lease reverts back to the government. The advantage of this scheme is that it specifically allows a valuation of alternative uses of the land to be reflected in the lease. For example, if the rental price of say, private grazing land were to rise, then this increase in value of the land should be reflected in the cost of a lease.[2] In addition, the annual rental per acre is, by statute, fixed at a

[2]A problem arises as to how an increase in demand is perceived—temporary or permanent. There may well be a certain amount of inertia in deciding whether to continue utilizing the lease or not.

minimum value, increasing over the first six years of the lease. So long as a fixed percentage rental is set at a rate above these minimums, it appears to be allowable under the statute the same as the fixed percentage royalty is currently used.

The rental payment, like a royalty, is a contingent payment system since a firm will be willing to make rental payments only to the extent that profits (actual or potential) justify it. In terms of risk transferral, a percentage rental scheme does not transfer much market risk to the government since it affects only the decision to operate or not operate, and does not affect the marginal production decisions. In this regard, a rental scheme has the desirable feature that it does not cause an early shutdown problem, although it may result in some coal fields not being developed.[3]

1b. Fixed Absolute Rental with Lump-Sum Bidding

In this scheme the lease terms are stipulated as so many dollars per acre, and the lease is awarded to the firm which offers the largest initial bid. This scheme, with the addition of a royalty requirement, is the one currently clearly authorized by law. This leasing arrangement has features similar to 1a, with the major exception that a competitive market is not used to generate the appropriate rental rate. That is, the rental terms must be set in dollars before the lease is let, and the burden is on the federal government to determine the optimal rental rate.[4] In essence, the proper allocation of land is set in the public sector. The risk sharing properties of this leasing structure are similar to 1a.

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[3]Rental payments affect only the total cost of a firm, not its marginal extraction cost since they are inherently unrelated to output. The effect on total costs may change a decision to bid for a lease to a no-bid situation.

[4]It is of course possible that a hybrid of the percentage and absolute rental schemes could be employed, e.g., a fixed money rate per acre with an "escalator clause" which would lower or raise the rental payment in accordance with the behavior of alternative uses of the land.

2. Fixed Bonus Payment with Rental Bidding

Under this arrangement, a stipulated sum of money is required, and a lease is awarded to the firm which gives the highest rental bid. For a given state of expectations about the future, the higher the bonus payment the lower will be the rental payment bid. This has the desirable property of allowing the government to share the risk, and reduce the anti-competitive effects of high initial capital outlays. However, if payments are not required until production actually begins, bidding on rental charges will have a tendency to encourage speculative behavior. If payments are required for the time the lease is let or if a diligence clause is used, then the tendency towards speculative behavior will be reduced.[5]

Rental bidding presents the same legal problem that royalty bidding presents. The statute requires a minimum rental to be offset against royalties, the sum of the rental to be fixed in advance of offering of the lease. Accordingly, it is reasonable to argue that the competitive bid procedure is not intended to override the fixed rental requirement. As discussed above, if the rental is fixed at the minimum, a bidding on a "surplus rental" is possible. Clarifying legislation or regulations would be a more clear and permanent solution.

3. Summary of Rental Schemes

The basic rental payment plans outlined above represent an alternative way in which the public sector can bear some of the risk involved in coal

[5]Although the effects of leasing arrangements on exploration have not been dealt with explicitly in this report, we do note that one advantage of rental systems is that they encourage rapid exploration. Consequently, however, a rental rate bidding system which was to occur *before* exploration, or other sources of information about the coal deposits may induce speculative behavior since the firm can "take a flyer" on the possibility that a particularly valuable, low extractive cost deposit exists.

leasing. In general, a rental scheme has the desirable aspect of not distorting the marginal production decisions of a firm; but, it is less able to spread risk versus a royalty plan. However, rental scheme has the potential of utilizing competitive market information to charge the "correct" rental rate. This possibility is of particular importance in meeting the goal of obtaining a fair market return while determining what the best use of a given tract is. It should be noted, however, that the payments for alternative use should be based on a fairly wide geographical basis, since the alternative use of one tract may be zero if it is surrounded by other leased tracts. An additional feature of a rental system is that it is easy to run, although the use of a percentage of alternative use rental scheme would create some information demands in terms of valuation. If a rental payment scheme is to be used in federal coal leasing, we suggest:

a. Careful consideration should be given to the relative merits of a percentage of alternative use rental scheme. The selection of this approach over a fixed fee rental system should depend upon the information costs and the legal feasibility of such an approach.

b. A leasing policy of lump-sum bids with a fixed rental structure is preferable to a rental rate bidding system because of the potential for speculative behavior. If it is deemed desirable, the problems occasioned by a "too large" lump-sum payment, namely the disadvantages of small firms vis-a-vis large firms to obtain financing on equal terms can be reduced by diligent production requirements.[6]

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[6]Although we assert that diligent production requirements can achieve the result of lowering the lump-sum payment by an arbitrary amount, it may require a production path which would appear to be anything other than diligent. The consequences of this, in terms of social cost, should be weighed against the desire to reduce capital market imperfections.

D. Profit Sharing Leases

Profit sharing schemes are leasing structures in which a share of the net business income from a lease accrues to the government. As in the previous cases, profit sharing can be combined with a noncontingent payment, e.g., a bonus payment. Since both rental and royalty payments are required under present law, short of legislative modification, some means must be found to incorporate or absorb these payments into the profit sharing scheme. However, the possibility of losses under a profit sharing system would require a modification of current statutes since this would violate the minimum payments provision of current law.

1. Fixed Percentage of Profit with Bonus Bidding

This lease allocation system requires that a stipulation share of the profit be allocated to the government, with the lease being awarded to the highest bonus bidder. The risk-sharing properties of this allocation scheme are extremely attractive since it does not distort production decisions,[7] and any degree of risk sharing can be achieved. Moreover, the higher the profit share the lower will the lump-sum payment be; hence, a profit sharing system can achieve high risk sharing and low lump-sum payments. A significant difficulty with a profit sharing scheme is its administrative complexity,

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[7] If profits, π, are devoted as $\pi = PQ - C(Q)$ where P is market price, Q is coal produced, and C(Q) is the total cost of production, then it follows that the level of output Q* which maximizes expected profits without profit sharing

$$V_1 = \int_0^\infty (PQ - C(Q))\, df\,(P)$$

also maximizes expected profits with profit sharing.

$$V_1 = \int_0^\infty (1-a)\,(PQ - C(Q))\, df\,(P)$$

where a = the share of profit going to the government, and f(P) is the distribution of possible coal prices.

specifically the definition of profits. If profits are not defined in an economic sense, then application of a profit sharing scheme may well lead to inefficient results. The difficulty inherent in a profit sharing system is that both public and private information networks are geared toward dealing with profits for tax purposes. If there are tax differences across industries for the reporting of profits, then it will be difficult to establish a consistent definition to operate this payment system upon.

A significant barrier to the implementation of a profit sharing scheme exists since there is no authorization in the statute for the Secretary to enter into profit sharing arrangements with coal operators or to fix a percentage of profit to be shared. If such profit sharing scheme could be characterized as an indirect royalty or a net royalty, it is arguable that this does not differ, in a legal sense, from either a royalty or a rental scheme.

2. Fixed Bonus Payment with Profit Share Bidding

This method of payment requires a fixed initial payment, and bidding is on the profit share. As in the previous two cases in which bidding was not on a lump-sum basis, the potential for speculative behavior exists. Attempts to reduce this hazard encounter the problem of causing significant front-end costs in terms of a high lump-sum payment which causes a barrier to competition. Since competitive bids are authorized to be taken but the basis of the bid is not specified, it is arguable that bids could be taken on the share of profit.

3. Summary of Profit Sharing Schemes

The use of a profit sharing lease can be an efficient means of enabling the federal government to absorb some of the market risk. In relation to alternative schemes discussed, profit sharing is more efficient since it

can achieve at least the same level of risk sharing without creating the production disincentives which lead to suboptimal field development. The major disadvantage is that the measurement of profits would be a difficult task, both conceptually and in practice. It should be noted, however, that if the sharing of profits required the use of the current tax system, in the sense of tax treatment of losses, it may create a bias against smaller firms. The current provisions of the corporate tax laws, which act as an insurance against risk, raise the question of the appropriate federal payment in case of a loss. Furthermore, if profit sharing is to include both profit and loss sharing, it would seem that new legislative authorization would unquestionably be required.

E. Coal Pledge Leases

A coal pledge is a leasing structure in which payment is made in terms of tons of coal produced, rather than in dollars. If payment is not met, then the lease is forfeited. The structure of this type of lease is such that the value of a payment is given by the price prevailing during each payment period, and, therefore, it will share the market risk of coal mining. The effects of a coal pledge will be similar to those of a rental lease, with a few modifications. In particular, the value of a lease will be dependent upon whether or not coal payments must be made from production on the leased land. If payments (i.e., tons of coal) are required to be produced (on the leased land), then the possibility exists that the time profile of production will be less than optimal. That is, a specified production requirement may force the firm to produce too soon. If payment is allowed to be made from any source, then the owner of a federal coal lease retains the right to speculate in terms of when to produce, but now the costs of such speculation will be borne by the speculator, and not the leasor.

The admissibility of this option under current legislation is somewhat unclear. A major question is: Can the government receive payment in kind under the Mineral Leasing Act? Although the characteristics of coal pledge are most like a rental agreement, if payment is required from the tract's production, then a coal pledge is very close to a diligent production requirement. The distinction between these two elements will have to be drawn carefully.

The preceding discussion of the legal implications of alternative leasing scenarios indicates that the current statute allows broad, although not unlimited, flexibility in designing an optimal leasing program. Each of the alternatives covered had different economic implications, however, and therefore, a choice must be made among them in terms of the relative desirability of one goal versus another. In the accompanying chart we list the major features of each leasing scheme, and indicate our evaluation of the relative merits of each. The different schemes are rated as high, moderate, or low.

Not surprisingly, there is no one system which dominates the others on all grounds. If legal feasibility and administrative costs were ignored, a form of profit-sharing would appear to be best. However, the magnitude of administrative costs required to determine profit and the dubious legal basis for profit-sharing argue against consideration of this method.

After eliminating profit sharing as a viable alternative, the best leasing structure, in our opinion, is one in which royalties and rentals are fixed in percentage terms (above statutory minimums) and bidding is on the size of the bonus payments. Although this structure is quite similar to recent practices in coal leases (pre-moratorium), it has not been chosen as an endorsement of recent practices. Rather, among the set of alternatives, this method

Table 5.1

	Avoids Production Disincentives	Avoids Excessive Speculation	Allows Optimal Risk Sharing	Gov't Receives Compensation for Risk Bearing	Avoids Barriers to Small Firm	Administractive Ease	Probability of Using this Scheme Under Present Legislation
Royalty Payments							
1. Fixed percentage royalty--bonus bidder	Low	High	High	High	Low	High	High
2. Fixed money royalty --bonus bidder	Low	High	Moderate	Moderate	Low	High	High
3. Fixed bonus--percentage royalty bidder	Low	Low	Moderate	Moderate	Moderate	Moderate	Moderate
4. Fixed bonus money royalty bidding	Low	Low	Moderate	Moderate	Moderate	Moderate	Moderate
Rental Payments							
1. Fixed percentage rental--bonus bidding	Moderate	Moderate	Low	Low	Low	Low	High
2. Fixed money rental --bonus bidding	Moderate	Moderate	Low	Low	Low	High	High
3. Fixed bonus--percentage rental bidding	Moderate	Low	Moderate	Low	Moderate	Low	Moderate
4. Fixed bonus--money rental bidding	Moderate	Low	Moderate	Low	Moderate	Moderate	Moderate
Profit Sharing Payments							
1. Fixed profit--share bonus bidding	High	High	High	High	Low	Low	Low
2. Fixed bonus--profit share bidding	High	Low	High	High	High	Low	Low
Coal Pledge Payment	Moderate	Moderate	Low	Moderate	High	Moderate	Low

seems most likely to attain the stated goals of the federal land leasing program. The major alternative is, of course, to have fixed bonus bids and bidding on royalties or rentals, subject to the legal considerations mentioned above. This approach has the disadvantage of encouraging speculative bidding behavior, at least as we have described it. There are possibilities that a different sort of decision rule about who wins the lease may change this judgment. For example, Vickery has observed that if a lease is awarded to the highest bidder at the *second* highest price, then firms will have no incentive to engage in speculative bidding.[8] It is not known, however, how sensitive this result is to the number of participants in the market.

In our opinion, given the uncertainties about the consequences of alternative bidding methods, the leasing structure recommended is the most practical. However, it would seem desirable that a regular program be instituted to experiment with the effects of different leasing and bidding methods. For example, it would be possible to have one or two leases offered under a system of royalty bidding with Vickery's rule determining the winning bid. The results of these experiments could then be judged against current practice. It should be noted that it will be several years before an evaluation can be made since the total payment under any scheme depends on the production stream which occurs. We endorse then, in principle, a program of experimentation about the effects of different bidding systems.

Finally, we note that the use of a bonus bidding system may, due to capital market imperfections, result in small firms being placed at a disadvantage. As mentioned above, the higher are the royalty and rental rates on a given

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[8]See W. Vickery, "Counterspeculation, Auctions, and Competitive Sealed Tenders," *Journal of Finance*, Vol. 16, 1, March 1961, pp. 8-37.

lease, the lower will be the bonus bid, and the less will be the disadvantage to small firms. In other words, the more risk that the Federal government assumes on a lease, the greater the spur to competition. Even if the optimal royalty rate still leads to relatively large bonus bids, alternatives such as installment payments[9] (perhaps over a three-year period) could be utilized to minimize these effects. On a more fundamental level, however, it is not at all clear that the Department of the Interior through the Mineral Leasing Act of 1920 should be attempting to effect the industrial structure of the bituminous coal industry. We do not dispute the proposition that more competition should be preferred to less; we do question whether a leasing program is the best, or even a feasible way to achieve this. A carefully developed leasing program can achieve orderly and timely resource development, protection of the environment, and set a fair market value for the disposition of public resources. It seems preferable that to the extent industry concentration impedes these goals, correction should be made by a different department and under a different statute.

[9]Installment payments are, in effect, interest-free loans.

Chapter VI

UNANSWERED QUESTIONS AND IMPLICATIONS FOR FUTURE RESEARCH

This report has attempted to address in a concise form some of the legal and economic implications of alternative leasing policies. Due to time and space constraints, certain topics could not be dealt with and others could be given only cursory treatment. Even among topics which were considered in depth, unequivocal decisions were sometimes difficult to make because of the absence of precise, quantitative information. In this chapter, we shall describe some of these areas and suggest avenues of inquiry which appear likely to be of aid to user agencies.

1. *What can be done to achieve desirable usage of land which has previously been leased?*

The current maze of leases exhibit both wide geographic dispersion and a low rate of production. A major legal question is how and in what manner the Federal government can regain control of these lands. As indicated previously, the potential use of non-compliance with diligent production requirements is one way to accomplish this objective, but the process is slow and cumbersome. Furthermore, *selective* enforcement of these previsions would be discriminatory. In terms of reducing the current checkerboard pattern of leases and reducing the attendant externalities, a major question arises. Could the government engage in land swaps itself? Moreover, if it can, what considerations should be reviewed?

2. *How does coal leasing relate to ancillary services such as rights-of way for railroads, slurry pipe, or transmission lines?*

The potential alternatives of producing energy from coal include such diverse technologies as gasification and liquification, on-site

(mine-mouth) production with the attendant need for transmission lines, and different delivery systems such as rail or pipeline. Each of these possibilities has a different impact on the area and the environment, and it is not clear how current laws allow for any control over the type of production. The primary questions are what are the effects (i.e., benefits and costs) of each, and how can the leasing system exercise control over development of the tract?

3. *What are the effects of different royalty and/or rental payments on production from a given lease?*

In this report it was argued that increases in the royalty rate, ceteris paribus, will reduce total production from a given lease. Although this result cannot be denied, the magnitude is not known. Since any decision about the level at which a royalty rate should be set necessarily involves a trade-off, there is a compelling need for a quantitative estimate of this effect. This is particularly important for achieving the goal of obtaining a "fair market value" from a given lease. In the same vein, given that leases can be swapped among firms and individuals, what restrictions should be put on the terms of sale? For example, if the government has established the royalty rate which it feels is best, it is clearly undesirable to have overriding royalty agreements on a swapped lease.

4. *What type of bidding arrangement is most desirable given the reality of the current and probable future structure of the industry?*

As noted in Chapter V, the past bidding practices have been deficient. However, except for some corrections, not much is known about what method of bidding is optimal. Economic theory provides only limited indications, and

these often apply only to markets with a large number of participants. For the case of coal-land leasing, however, a large number of participants is not likely and thus it would be desirable to know how sensitive the bidding methods are to possible collusion. There is a need for both theoretical research and empirical work on this topic.

5. *How can the Federal government utilize a profit-sharing type of lease without encountering great administrative cost?*

In Chapter V it was observed that a profit-sharing type of lease was desirable on many grounds, except for administrative costs and feasibility under the current law. How great would these costs be? The legal questions are of considerable interest also since the government may, in effect, become the partner of a monopolistic enterprise if profit sharing were employed.

6. *How can surface right owners be assured of adequate compensation?*

The compensation which is due to surface right owners is currently a murky question. Although future congressional action will undoubtedly deal with the issue, the major question is how will such compensation be based, and what effect will this have on leasing. These issues are not unlike those faced in other areas such as urban renewal or highway construction in which consolidated land parcels are needed. The peculiar characteristic in this case is that the land will be given back in an as yet unknown form.

Appendix I

RISK, RISK AVERSION, AND RETURN TO THE TREASURY

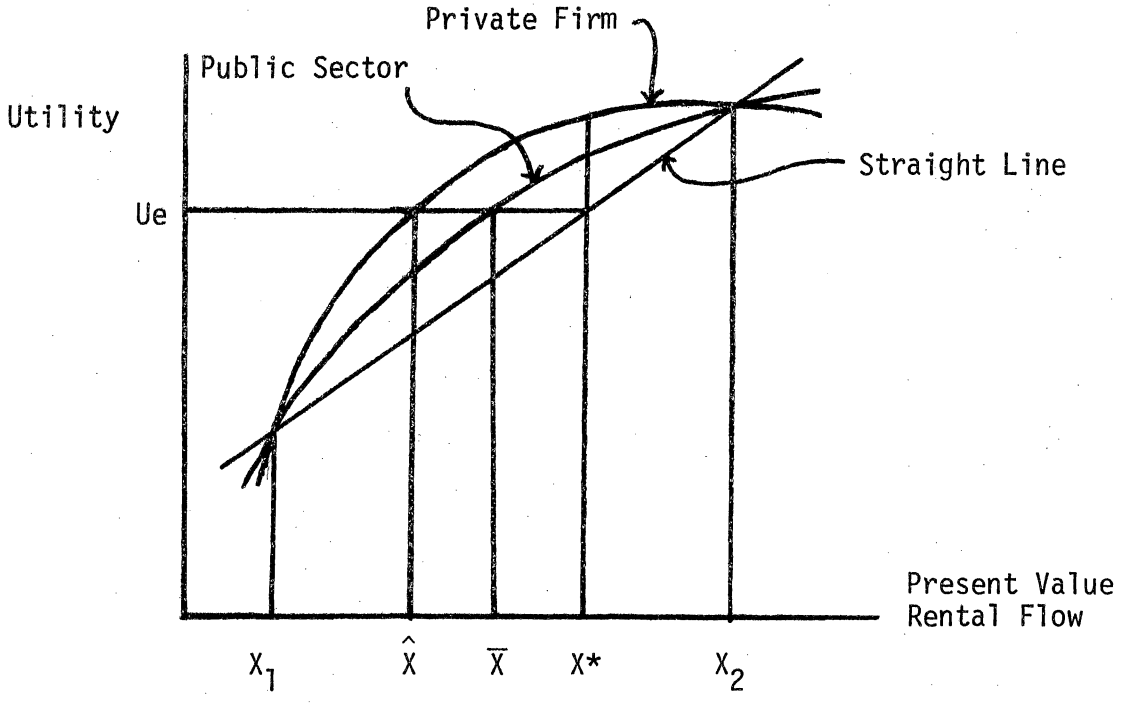
This appendix will prove the assertion that leasing policies that permit the government to assume the major part of the risk of resource exploitation are superior to transfer mechanisms that distribute leases on a nonconditional basis. It will be demonstrated that a conditional payment policy will permit the government to obtain a larger resource rent than a nonrisk sharing leasing regime. Moreover, these arguments will concurrently assert that a policy that transfers all the exploitation risk to the public sector will permit complete extraction of the expected rental value of the resource by the treasury. If any measure of risk continues to reside on the private sector, then the public will not realize the rental value that it could expect to obtain by exploiting the resource itself (assuming equal extraction costs for both sectors).

Making the traditional assumptions that (1) all parties exhibit risk averse preferences, and (2) the institutionalized spreading of risk will result in a less risk averse aggregate preference relation for that institutional structure relative to its constituent members, then we may assert that the government sector will behave in a less risk averse manner than private firms due to its inherently more massive constitution. Hence, in our analysis of the behavior of the private sector juxtapositioned with the public sector, the latter will be portrayed as the more risk prone party.

Following the literature on expected utility theory, the characteristic of being risk averse will be analytically interpreted as meaning: for a given income situation that contains an element of risk, the expected utility measure will be less than the utility derivable from the certainty equivalent

expected income level. That is, if a risk averse individual is subjected to a stochastic event with an expected income measure X, then his expected utility is less than the utility associated with a certain income of X dollars; and the greater this differential the more risk averse is his preference relation.

This may be portrayed graphically as a plot of income vs. utility, and the degree of concavity is directly related to the measure of risk aversion; hence, in such a graphical development the public sector will always be presented as relatively less concave than the private sector. To examine the rent transfer characteristics of conditional vs. nonconditional leasing policies for a given mineral right, the following figure will be of central importance:



In order to simplify the narrative; all values discussed will be interpreted as the present value of the various monetary flows. Moreover, the horizontal axis is understood as the net revenue value after all extraction, transport, marketing, production, and opportunity costs are removed; hence,

it is the return to or the (present value) rental value of the mineral right. Under these interpretations:

X_1 = the absolute minimum rental value of the mineral right.

X_2 = the absolute maximum rental value of the mineral right.

X^* = expected value of the mineral right (i.e., risk weighted average of X_1 and X_2).

Under the expected utility hypothesis, the expected utility for *both* the private firm and the public sector from this risk ladened mineral right is given by:

$$U_e = \lambda U(X_1) + (1-\lambda)\ U\ (X_2)$$

where λ is the probability that X_1 will be the resultant rental value of the resource (note: this is the straight line on the figure).

It may now be observed that if risk aversion was not present, then X^* would be both the private sector offer price and the public sector asking price for this right. However, given the risk aversion factor, it is clear that the public sector should not accept less than $\overline{X}$, the certainty equivalent rent value of the resource; $\overline{X}$ is the rent value that will yield a level of utility, should it be available with certainty, that is equivalent to the expected utility of the stochastic rental measure X^*. Hence, if $\overline{X}$ or greater were offered for the mineral right, the government should accept the bid, since even exploiting the resource itself would not yield a higher level of public sector utility. Hence, $\overline{X}$ is the *minimum public sector asking price for the resource.*

From the private sector's viewpoint, it can be observed that the *maximum offer price* is given by $\hat{X}$; $\hat{X}$ is certainty equivalent rent value of the resource to the typical private firm. That is, since the private firm offering

$\hat{X}$ has a certainty utility measure of $U(\hat{X})$ which is equal to the expected utility from the exploitation of these mineral rights, it will never offer more than $\hat{X}$ for the right to mine this resource. Therefore, from the above argument it is apparent that the maximum private sector offer price $\hat{X}$ due to the existence of differing degrees of risk aversion in an uncertain environment.

If a competitive bonus bid process (for example) is employed to distribute these lease rights to the private sector, then the competitive offer price will be a maximum of $\hat{X}$, since this process requires the private firms to assume all the exploitation risks. Hence, the public sector is, in effect, required to pay an *insurance premium* to the private firm of $\overline{X} - \hat{X}$ dollars in order to induce private sector involvement.

By employing a leasing strategy of a conditional payment variety, which permits the public sector to bear the risk, the added intensity of risk aversion in the private sector will not impact the bid as significantly. As a limiting case, if a conditional payment structure is employed that will result in only the *realized* rental value accruing to the public treasury, then the public sector will extract *all* the resource rent as if it exploited it itself. Under this structure, the firms bears no risk and the expected return to the treasury is X^*.

Summing up, if the leasing structure permits the public sector to bear all the risk, then the bid upon stipulation (royalty rate, etc.) will be bid up to an expected present value of X^*; that is, the competitive rate will be pushed to the point that the public treasury receives an expected income equal to that value that it could expect to obtain by exploiting the resource itself. Alternatively, if the leasing regime requires some risk sharing by the private

sector, then the competitive bidding practice will not push the relevant payment rate to a present value level of X*; that is, the differential risk aversion character of the private firm will cause the bidding to be subdued, and an insurance premium will be realized and paid by the public sector. Hence, conditional payment structures will result in higher resultant rental values accruing to the public treasury; the greater the risk transfer to the public sector implied by the leasing regime, the more closely will the resultant bid approach the expected value of the resource.

Appendix II

PRIVATE BEHAVIOR, EXTERNALITIES, AND ROYALTY DECISIONS

It has been argued[1] that the Federal government may employ a royalty payment policy as a technique for controlling the rate of exploration of coal resources. Specifically, in order to prevent private developers from operating a mine when the social benefits of that operation do not equal or exceed the social costs, a royalty can be imposed to correct the private calculus. Since external costs of production are relevant in the social decision context but not directly taken into account by the private operator, a royalty could be structured to require the developer to consider the full social consequences of his mining operation. This appendix will reflect upon this argument and elaborate on the comprehensive impact of such a policy.

A stipulated royalty has the direct impact of increasing the marginal costs to the private developer. Equivalently, one may view a royalty as a decrease in the market value to the developer of each unit of resource marketed. This impact of a royalty would reduce the profitability of exploration and development and (hence) have a thwarting impact on the rate of exploitation and the competitive bid. Alternatively, with respect to the preference right allocation mechanism, a royalty would result in a reduction in the rate of exploration and development. It is from this behavioral impact that many have argued that the royalty mechanism deserves further attention as an instrument for controlling the exploitation rate in a manner that would reflect the external and intertemporal costs of an activity.

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[1] Most recently by Dr. Darius W. Gaskins, Jr., Acting Director, Office of Minerals Policy Development, U.S. Department of the Interior.

This appendix calls the attention of policy makers to a *secondary* impact of the royalty mechanism. Specifically, as the royalty rate is increased, the distribution of the uncertainty element of exploration and development is transferred to the public sector. A royalty payment must be viewed as conditional payment which is activated only under the success event in a stochastic process. As such, as the royalty rate is increased, the private developer becomes correspondingly less and less subject to the risk character of the mining operation, and associated with this reduction in risk is imputed a risk premium accruing to the developer. That is, the benefits derived from this risk sharing will either be reflected in an increased bid under the competitive mechanism, or an increased intensity of exploration under the preference right mechanism. (Equivalently, royalty policies imply risk sharing which in turn result in a reduced risk impacted private discount rate.) This behavioral influence of a royalty policy argues for an increased intensity in bidding and development. Therefore, it is apparent that the net impact of a royalty payment is a *composite* of two private behavioral influences.

In order to assess the net influence of a royalty policy somewhat more carefully, assume (for the moment) a competitive bid process with rates of development and exploration invariant. Under such conditions, the raising of a royalty rate will impact strictly upon the magnitude of a competitive bid and the qualitative impact may be analyzed in the following manner:

1. The marginal cost of extraction will be impacted by the value of the royalty payment. Therefore, the competitive bid will be *decreased* by the present value of these expected royalty payments over the commercial life of the mine.

2. Recognizing that a royalty structure is a conditional payment, it is asserted that the reduction in private risk derived from this policy can

be imputed as an insurance *premium*. Therefore, this component of the royalty program will impact upon the competitive bid as the present value of these premiums.

3. The summation of the impacts given in (1) and (2) (which are opposite in sign) will be the net impact of the royalty structure.

The net impact on the competitive bid is, therefore, an empirical question; however, it seems reasonable to expect that the net effect will be a reduction in the resource bid. The important observation presented in the above commentary is that the net impact will be somewhat *less* than the present value of the royalty payments, and (hence) a royalty structure imposed to adjust private behavior in a manner reflecting the full social costs of development, must employ a royalty rate which is *higher* than the relevant externality costs. Equivalently, if the external costs of production in each period can be denoted by X, then the royalty payment in each period must be *larger than* X in order to assure that the private calculus completely reflects these external production costs.

It may be noted that relaxing the hypothetical constraints imposed above would only result in the net impact being distributed over the spectrum of private decision making in the bidding-exploration-development process. Hence, the above arguments are directly generalizable to the more complex framework. However, it should also be observed that the *incidence* of the royalty impact is an empirical question since it will be distributed among the bid value, exploration, and development rate. This observation provides an *additional* justification to assert that the royalty payment must be higher than the rate just sufficient to cover the external costs.