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COMPETITIVE ASPECTS OF THE GOVERNMENT'S RESEARCH AND LEASING POLICIES FOR THE ROCKY MOUNTAIN OIL SHALE LANDS

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In the area of what is now northwestern Colorado, southwestern Wyoming, and eastern Utah, about sixty million years ago when the last dinosaurs were taking leave of the Earth, the Rocky Mountains were upfolded and great basins between the mountains were formed. These basins became broad, shallow lakes, slowly filling with sediments deposited by mountain streams charged by abundant rainfall. The climate was warm and sunny. Algae and other organic life abounded in the lakes and settled to the bottom finely interspersed in the sediments. With time conditions changed, resulting in faster sedimentation of coarser particles, so that ultimately the lakes were filled with sands.¹ A few million years ago the lands were uplifted to about their present altitudes. The thickest deposits, in which the organic material was trapped in such profusion, now lie buried under hundreds, and even thousands of feet of rock in the center of the ancient basins. These beds are thickest and deepest in the center of the former basins.²

The organisms decayed leaving the rock impregnated with a finely divided solid matter called kerogen. The rock is called oil shale. When the rock is crushed and destructively distilled at high temperature, the kerogen is converted into a synthetic oil with essentially the same general characteristics as those of many native crude oils.³ In some places the sediments are interspersed with large quantities of carbonate minerals, including dawsonite, a sodium aluminum carbonate, and nahcolite, a sodium carbonate.

Together, Colorado, Wyoming, and Utah contain about 11 mil-

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1. Bradley, *Origin and Microfossils of the Oil Shale of the Green River Formation of Colorado and Utah*, United States Geological Survey Professional Paper 168, at 54-56 (1931); Bradley, *Limnology and the Eocene Lakes of the Rocky Mountain Region*, 59 Bulletin of the Geological Society of America 635 (1948).

2. See generally, Donnell, *Tertiary Geology and Oil-Shale Resources of the Piceance Creek Basin Between the Colorado and White Rivers Northwestern Colorado*, 1961 United States Geological Survey Bulletin 1082-L. The geological map and cross-section shown on Plate 48 of the pocket supplement vividly display the general geology of the Piceance Creek oil shale area in Colorado.

3. Duncan and Swanson, *Organic-Rich Shale of the United States and World Land Areas*, United States Geological Survey Circular No. 523, at 2-3 (1965).

lion acres of land described by the United States Department of Interior as oil shale lands. The deposits vary considerably in thickness and kerogen content. Private ownership by fee title or state leases involves about 28 percent of the acreage with the rest of the lands under federal ownership.⁴ About 5,200,000 acres of the federal land in Colorado, Wyoming, and Utah are subject to unpatented mining claims, including many alleged to have been located prior to the passage of the Mineral Leasing Act of 1920.⁵ About 1.5 million acres of the federally owned lands are the subject of metalliferous mining claims alleged to have been located in 1966 and early 1967.⁶

Shale lands may be classified by the estimated yield of oil per ton of rock. Those Rocky Mountain oil shales, usually referred to as part of the Green River Formation, which would yield 10 gallons or more per ton, are estimated to contain about 7.4 trillion barrels of oil equivalent. This is nearly 200 times the American Petroleum Institute's estimate of 39.8 billion barrels of proved recoverable reserves of natural liquid hydrocarbons in the United States. The higher grade shales, those yielding 25 gallons or more per ton, contain an oil equivalent of 0.6 trillion barrels, or about 15 times the nation's proved recoverable reserves of natural liquid hydrocarbons.⁷

One square mile of oil shale land in the center of the Piceance Basin in Colorado, containing the thickest, richest, but the most deeply buried of the evaluated reserves, has been estimated to contain about 1 billion barrels of oil, 40 million tons of alumina, and 80 million tons of soda ash.⁸ This alumina, if recoverable, would represent about seven times the nation's annual production of about 5.9 million tons in 1965.⁹ The soda ash, if recoverable, would represent about 13 times the nation's annual production of about 6.4 million tons in 1965.¹⁰

Lest the reader count his blessings too hastily, let him note that the first commercial oil shale mine has yet to be dug, the first commercial retort has yet to be built, and recovery processes for alumina or soda ash from oil shale have yet to be proved, even though in

4. *Hearings on Competitive Aspects of Oil Shale Development Before the Subcomm. on Antitrust and Monopoly of the Senate Comm. on the Judiciary*, 90th Con., 1st Sess., pt. 1, at 75-77 (1967). [Hereinafter cited as *Antitrust Hearings*]; United States Dep't of the Interior, Report on the Prospects for Oil Shale Development - Colorado, Utah and Wyoming, Table A-1 (May, 1968). [Hereinafter cited as *Interior Oil Shale Report*]

5. *Interior Oil Shale Report*, *supra* note 4, at Table A-3.

6. *Id.* For a discussion of problems these metalliferous claims raise under the mineral laws, consult *The "Associated Minerals" Dilemma and the New Federal Oil Shale Policy*, 39 Colo. L. Rev. 370 (1967).

7. *Antitrust Hearings*, *supra* note 4, at 74-75.

8. *Id.* at 75-76.

9. United States Department of the Interior, 1 Minerals Yearbook 223 (1965).

10. *Id.* Table I, at 856.

Colorado alone some 250,000 acres of oil shale lands are held by about 20 oil companies. The shale deposits on these lands generally occur at or near the surface, in fairly thick beds which would yield 25 or more gallons of synthetic crude oil per ton of rock.¹¹ Thus kerogen and minerals contained in the buried rock are not necessarily wealth in the economy or money in the Treasury.

In view of the prospect that the public oil shale lands hold wealth of a staggering magnitude, it is not surprising that the subject has generated a debate as to whether the market place can be relied upon to allocate the public oil shale resources properly. Some members of Congress,¹² Secretary of the Interior Stewart L. Udall,¹³ and the Governors of Colorado, Wyoming, and Utah¹⁴ have proposed that private enterprise be permitted to lease the public oil shale lands. Some other members of Congress have sponsored bills to preclude leasing until a federal research and development program is completed, and the United States has built and made operative a full-scale mining and processing facility or facilities.¹⁵ There are also proposals that the Government sponsor research at the same time that it is leasing oil shale land to private parties.¹⁶

The proposals for government research and development ventures, including the government operation of oil shale production

11. *Antitrust Hearings*, *supra* note 4, map foldout facing 178.

12. *Id.* at 263-76 (testimony of Senator Gordon Allot, Colo.); *Id.* at 215-17 (testimony of Senator Wallace Bennett, Utah); 113 Cong. Rec. S. 9411-14 (daily ed. July 11, 1967) (remarks of Senator Phillip Hart, Mich.); address by Congressman Wayne N. Aspinall, Colo., *Political Aspects of an Emerging Oil Shale Industry*, before the Society of Petroleum Engineers of the A.I.M.E. New York City, Feb. 28, 1966.

13. United States Dep't. of the Interior News Release, Proposed Regulations to Govern Oil Shale Leasing and Land Exchanges Announced May 7, 1967, reprinted in *Hearings on the Federal Oil Shale Program Before the Senate Comm. on Interior and Insular Affairs*, 90th Cong., 1st Sess., at 130-131 (1967). [Hereinafter cited as *Interior Hearings*]; *Interior Oil Shale Report*, *supra* note 4, at 128-33. The Report recommends the offerings of two test leases, each for a sufficient acreage of resource to satisfy a 35,000 to 50,000 barrel-per-day plant, for the period to amortize the investment, which is estimated to be from 20 to 30 years. One lease would be in the area of thick, deep shale beds of the Piceance Basin; the other in an area of thin beds amenable to conventional mining and retorting techniques.

14. Letter from Governor John A. Love, Colo., Governor Calvin L. Rampton, Utah, and Governor Stanley Hathaway, Wyo., to Secretary of the Interior Stewart L. Udall (Oil Shale Program) undated, received by the Dep't. of the Interior August 10, 1967, reprinted in *Interior Hearings* at 143-48.

15. S. 2754, 90th Cong., 1st Sess. (1967). Introduced by Senator Proxmire, Wisc., for himself, and Senators Morse, Ore., Tydings, Md., Clark, Pa., Metcalf, Mont., and Young, Ohio. 113 Cong. Rec. S. 18169 (daily ed. Dec. 8, 1967); H.R. 14562, 90th Cong., 1st Sess. (1967). Introduced by Congressman William F. Ryan, N.Y., 113 Cong. Rec. H. 17208 (daily ed. Dec. 15, 1967).

16. See, e.g., Dep't. of the Interior News Release, Five-Point Oil Shale Development Program Announced Jan. 27, 1967 reprinted in *Antitrust Hearings*, *supra* note 4, at 489-91; *Interior Oil Shale Report*, *supra* note 4, at 123-25.

facilities, are based on the view that until additional technology is developed the market place cannot be relied upon to allocate the public oil shale resources properly. The fear has been expressed that unless a technology is developed and made available to all competitors before the land is leased, (a) the resource will be monopolized by a handful of companies which possess the critical technology, and (b) the public oil shale lands will have been alienated at a small fraction of their potential value.¹⁷

This article seeks to make the case (1) that government-sponsored research is not inconsistent with the functioning of a competitive system, and (2) that when the public oil shale resources are disposed of to private parties, competitive leasing is the best method to prevent a monopoly of technology, to allocate the public oil shale resources properly, and to protect the revenue interests of the United States.

I

THE EFFECTS ON COMPETITION OF GOVERNMENT-SPONSORED RESEARCH

Oil has not yet been produced from oil shale in the United States except on a research basis. Opinions vary as to whether with present technology commercial production of oil shale would be profitable now.¹⁸ It is not possible to conclude with any assurance that critical technology would be readily accessible to all competitors seeking to develop public oil shale lands. The absence of this assurance has caused concern that if the technology were tightly held, the opening of the public lands would result in an expansion of a technology monopoly into a resource monopoly. Secretary of the Interior Udall expressed this concern during his testimony before the Committee on Interior and Insular Affairs, United States Senate, on September 14, 1967, when he stated:¹⁹

17. See, e.g., 113 Cong. Rec. S. 18169 (daily ed. Dec. 8, 1967) (remarks of Senator Proxmire); *Interior Oil Shale Report*, *supra* note 4, at 125-26.

18. Among those asserting that adequate technology now exists for economic mining and processing of oil shale are Walter Mead, Professor of Economics, University of California, Santa Barbara, California, *Antitrust Hearings*, *supra* note 4, at 378, and Morton Winston, vice president of The Oil Shale Corporation, *Antitrust Hearings*, *supra* note 4, at 308. Those who have expressed doubt as to the existence of an adequate technology include Professor Morris Garnsey, Department of Economics, University of Colorado, *Antitrust Hearings*, *supra* note 4, at 41, and Secretary of the Interior Udall, *Interior Hearings*, *supra* note 13, at 176-77. A concise review of the state of the art is given by Wade Watkins, Director of Petroleum Research, United States Bureau of Mines, in *Antitrust Hearings*, *supra* note 4, at 87-104. A more recent review is given in *Interior Oil Shale Report*, *supra* note 4, ch. 4 at 40-79.

19. *Interior Hearings*, *supra* note 13, at 182.

But we did not feel that we could make the resource available for the purpose of developing the technology without guaranteeing that the technology would be available to develop the resource over the long-term future.

The Department of the Interior has also expressed concern that the alienation of the public resource before an adequate technology is available could result in inadequate compensation to the public. The Department's recent report on oil shale prospects states:²⁰

This study indicates that the value of the resource in place now is small, and will remain so until new technology has been developed and proved. Industry, if it purchases the resource subject to the development of improved technology in the future, probably would discount its bid at the rates it uses for alternative delayed return investment opportunities. Since this could reduce the bonus bids, the Government should alienate little of its holdings until improved technology is developed or shown to be available by bids of appropriate size.

The Department of the Interior has proposed government expenditures on research as one method for reducing the hazard that a monopoly of technology will result in a monopoly of production from public lands.²¹

In considering the effect of government-sponsored research on the functioning of competition, one aspect of the question must be emphasized. The United States, acting through the Secretary of the Interior, holds the public lands in trust for the people of the country.²² Some research expenditures may offer prospects for enhancing the value of the government's holdings. They may represent investments which any reasonable landlord would consider prudent and any reasonable trustee would consider obligatory. Included in this

20. *Interior Oil Shale Report*, *supra* note 4, at 126.

21. The research spending features of Secretary Udall's Five-Point Oil Shale Program announced January 27, 1967, are points four and five. Point four would involve joint research with industry in the use of nuclear explosives to fracture oil shale to permit retorting *in situ*. Point five contemplated a total expenditure of 100 million dollars over 10 years for research in oil shale technology, economics and geology, and into means of protecting the environment. *Interior Hearings*, *supra* note 13, at 177. Also consult *Interior Oil Shale Report*, *supra* note 4, at 123 and 124-25. The Dep't. of the Interior had also proposed the use of research and development leases to develop additional technology. 43 C.F.R. sec. 3170-72 (1968). This proposal is discussed in text accompanying note 43, *infra*.

22. "The Secretary is the guardian of the people of the United States over the public lands. The obligations of his oath of office oblige him to see that the law is carried out, and that none of the public domain is wasted or is disposed of to a party not entitled to it." *Knight v. U.S. Land Association*, 142 U.S. 161, 181 (1891). See also *Cameron v. United States*, 252 U.S. 450, 459-60 (1920).

category would be government investment which tended to enhance the land values by developing and disseminating technology which would make shale oil production profitable. Where such investments would ordinarily be made by the landlord, whether private or public, they reflect the market place at work, rather than an interference with it.

At the same time, some kinds of government research and development expenditures to enhance its land values might displace private efforts and dull the cutting edge of competition by subsidizing those who would not do research on their own. Thus, while it is unreasonable to expect the Government to forego research investments which any prudent entrepreneur might make to enhance the value of his lands, solely because the investments would incidentally subsidize less aggressive competitors, it is equally unreasonable for the Government to invest in research ventures which would subsidize the inert, while offering little or no promise of enhancing its land values.

Tested by this standard the proposal for government construction and operation of a full-scale commercial oil shale mining and retorting facility as a device to develop new technology raises several questions. In analyzing the problem, let us assume that the government plant will be for research and demonstration purposes only, and the Government will not continue to market its products when the research effort is completed. Such investment might be for research into the mining of thick, deeply buried deposits by nuclear fracturing, or by open pit or cut-and-fill methods, or for the retorting of such deposits in place. The venture would tend to benefit government land chiefly because the Government holds large amounts of such oil shale lands and private parties hold much less. Investment of this character would therefore not tend to interfere with competition.

If the investment were made in a demonstration plant to improve technology useful on the type of deposits which are held in abundance by private parties as well as by the Government, it is more difficult to justify the government effort, because the degree of subsidy to private parties would be magnified, and the intensity of private efforts might be lessened. As a result, the opportunities for innovation offered by a diversity of efforts would be undermined.²³ Nonetheless, this kind of demonstration plant would be justifiable if

23. The case for a diversity of efforts is made in J. Jewkes, D. Sawers and R. Stillerman, *The Sources of Invention* (1958). Consult especially, the discussion of monopoly and development, ch. VII, at 212-22.

there were reason to believe that private efforts would not be displaced.

In this regard the present tax treatment of oil shale is relevant. The Internal Revenue Service has ruled that the percentage depletion allowance rate on oil shale is 15 percent,²⁴ to be applied to the gross income from the mined rock.²⁵ The percentage depletion allowance rate on crude oil is 27½ percent.²⁶ In each case the maximum depletion allowance permitted is 50 percent of net income from the property.²⁷

At the 15 percent rate, and with the 50 percent net income ceiling a barrel of semi-refined shale oil worth \$3.69 delivered at a Midwest refinery (assuming by-product credits) would have a depletion allowance worth about 5 cents after taxes on the gross income attributable to the mined rock.²⁸ If the rate were 27½ percent, and applied to the retorted oil, the allowance would be worth about 40 cents per barrel after taxes.²⁹

It is not surprising that there have been efforts to change the depletion treatment of oil shale.³⁰ Such efforts could be nullified by a demonstration that oil shale production was profitable under existing tax treatment. It is therefore not unthinkable that there is a business incentive in delaying investment in oil shale in the hope of demonstrating a need for more favorable tax treatment. On the other hand, investment in oil shale has yet to be proved to be an economic alternative to investment in other hydrocarbon energy sources, and the absence of greater investment may reflect only a judgment by entrepreneurs to prefer safer investments.

Even if the latter were true, however, it does not follow that a research plant investment by the Government would be imprudent because the same investment would have been an imprudent one by a private landowner. The decision in each case would involve a judgment as to whether the estimated risk-discounted value returned will exceed the cost. The risk discount will be the same

24. Rev. Rul. 57-529, 1957-2 Cum. Bull. 325.

25. Private rulings, in the 1950's and early 1960's; Letter from T. Coleman Andrews, Commissioner of Internal Revenue Service, to Senator Eugene Milliken, Colo., May 16, 1955.

26. Int. Rev. Code of 1954, § 613(b).

27. Int. Rev. Code of 1954, § 613(a).

28. *Interior Oil Shale Report*, *supra* note 4, at 109.

29. *Id.*

30. See, e.g., S. 1068, 90th Cong., 1st Sess. (1967); H.R. 395, 89th Cong., 1st Sess. (1965), to amend sec. 613 (c) (4) (e) of the Internal Revenue Code of 1954, 68 Stat. 210 (1954), as amended, 74 Stat. 293 (1960), 26 U.S.C. sec. 613 (c) (4) (e); Testimony of Morton Winston of The Oil Shale Corp., *Antitrust Hearings*, *supra* note 4, at 339-40.

whether the investment is private or public, but a government investment would cost less because of lower interest costs, and the potential return in land value enhancement may be greater for the Government because it owns so much more oil shale land than any private party. Thus even if the lack of private investment reflected only a negative judgment on the economic potential of oil shale, the government investment might be prudent. That being the case, if there is reason to believe that private efforts will not be forthcoming, a government demonstration plant, looking toward enhancing government land values, may be justifiable even if the techniques investigated would also benefit private landowners.

It should be noted that the justification for a government demonstration plant does not require that the Government operate plants other than for research purposes, i.e., to market the products after the research is completed. Such government operations would have these characteristics:

- (1) Lower interest costs than private enterprise;
- (2) No land acquisition costs;
- (3) No state property, income, or severance tax costs, and no federal tax costs;
- (4) No necessity of operating at a profit rate comparable to the rate at which private parties must operate.

It is most unlikely that private parties will rush to the Land Office for leases so that they can do battle against that kind of competition. The presence of the Government as a competitor is therefore likely to deter other entrants and depress, rather than enhance, the value of other government shale lands. At the start, therefore, it should be made clear that the government facility will not operate to market shale oil after its research mission has been fulfilled.

In sum, it must be recognized that the Government should not be denied opportunities for enhancing its land values through research expenditures which any prudent landlord would make. Such expenditures might require a delay in the leasing of land to private parties with the expectation that any loss in revenues during the research interim will be more than compensated for in increased resource values resulting from the research. At the same time it should be recognized that government research efforts would not preclude private parties from engaging in research on their own lands.

We can now turn to the question of how the lands should be made available to private parties.

II

THE DISPOSAL OF PUBLIC OIL SHALE RESOURCES TO PRIVATE PARTIES

At the outset it is necessary to consider whether imperfections in the market place make competitive leasing unworkable. One possibility is that a few large companies would monopolize the bidding because they would be the most efficient operators. However, there is no evidence to suggest that a shale mine and retort of optimum size will be more efficiently operated if owned by a large company. In any event the most efficient should be permitted to benefit from their efficiency.

A more serious problem is the possibility that because a shale plant might cost 138 million dollars or more³¹ only the largest companies could muster the capital. The problem of capital barriers to entry has been described as follows:³²

What we generally do know is simply (1) that the most-favored established firms generally did have and now have access to internal financing or to the capital markets at relatively favorable terms; (2) that entrants would need to raise various large amounts of money to finance entry; and (3) that as the capital requirement for entry becomes larger raising money is thought to become "more difficult," presumably in the sense that either the effective interest cost is greater, or "rationing" of funds limits more and more severely the roster of potential entrants, or both. In addition, on the postulate that established firms enjoy a generally preferred position and have not encountered diseconomies of accumulating large amounts of funds, it is frequently thought that entrants are generally at some basic disadvantage in capital costs, and that this disadvantage increases with the increase in the capital requirement. This would imply that, among industries, the barrier to entry imposed by capital requirements is higher as the capital requirement is higher, and also that there is probably some tendency within any industry toward capital-cost diseconomies of increasing scale to the entrant.

In addition to the capital barriers, there is some reason to be concerned that vertical integration would inhibit entry of non-integrated firms into the oil shale business as a result of the operation of the tax laws. A recent report of the Attorney General indicates that the special tax treatment for crude petroleum production tends to encourage integrated firms to favor their own crude oil, or bartered-

31. *Interior Oil Shale Report*, *supra* note 4, Table 3 at 53; *See also* United States Bureau of Mines, *A Cost Evaluation of an Oil Shale Plant Circa 1966*, at 49 (1967).

32. J. Bain, *Barriers to New Competition, Their Character and Consequences in Manufacturing Industries* 46 (1956).

for crude oil, over crude oil purchased in the open market. The report states:³³

Despite these added costs, however, integration has one possible advantage peculiar to the oil industry. In orthodox economics, an integrated firm must ordinarily judge its total performance in terms of its over-all investment and cost of operations as against the total returns received. Transfer prices at intermediate levels are established only for accounting purposes. Ordinarily these transfer prices parallel the market price at that stage of processing, in order to show the relative value of further processing steps as against the price which could be realized on sale at that level. Unrealistic transfer pricing would be simply accounting self-deception. But, in any event, these intermediate internal prices are irrelevant in judging the over-all profitability of the corporation.

In oil, however, a producing-refining-marketing firm has a considerable incentive to establish transfer prices so adjusted as to place the bulk of profit at the producing level. In contrast to other levels, the special tax incentives to production, aimed at increasing the resource base, make possible at that level a substantially greater proportion of after-tax yield for each dollar of profit earned.

This suggests that a non-integrated refiner can compete effectively with the integrated firm only if it can purchase crude oil at a price discounted by the amount of saving which the tax law provides the integrated refiner. To state it otherwise, the non-integrated producer of crude oil can expect to realize less from the sale of his product.

Whether the same condition would exist with respect to shale oil depends on the degree of benefit which the depletion allowance on shale oil might confer.

As stated above, the depletion rate on oil shale is 15 percent of the gross income from the mined rock, not to exceed 50 percent of net income. On the basis of the data referred to above, depletion allowance on the gross income attributable to the mined rock would be worth about 10 cents before taxes or 5 cents after taxes. (A gross income per barrel of \$1.23 is attributed to the mined rock.)³⁴

Assuming that integrated producers were able to maintain a posted price 20 percent higher than the real price of \$1.23 attributable per barrel, the maximum base for depletion would be \$1.478 per barrel. At 15 percent the maximum depletion which then might be allowed would be worth about 22 cents before taxes or about 12

33. United States Department of Justice, Report of the Attorney General Pursuant to Section 2 of the Joint Resolution of September 6, 1963, Consenting to an Interstate Compact to Conserve Oil and Gas, 77-78 (July 1967).

34. This figure, upon which the 5 cents per barrel after tax worth of depletion allowance was based, in *Interior Oil Shale Report*, *supra* note 4, at 109, was supplied to the author of this article by the Bureau of Mines.

cents per barrel more than on the basis of the real price. This is the potential cost advantage which would result under the depletion rate from integration of mining and retorting, assuming a 20 percent difference between real prices and posted prices were accepted for depletion purposes.

It is doubtful, however, whether this difference could be maintained. Mined shale would have low value in relation to its volume and weight. It will probably be retorted quite close to the mine mouth. It is therefore doubtful whether an active cash purchase market will develop, and it is questionable whether sales will be accepted by the Internal Revenue Service as evidencing the real price. Thus there is reason to doubt an ability to establish a substantially higher basis for depletion than the real price. In addition, any tax benefits of integration would be equally available to all who mined and retorted. Since the close association of mining and retorting suggests there will ordinarily be common ownership of both, it is likely that all or most shale oil producers will get any such benefit. Nonetheless, it has to be recognized that existing tax law might result in some added benefit to vertical integration, and if the depletion rate were applied to the shale oil and the rate were increased, an advantage of integration into refining might be created. However, if high capital requirements and the operation of the tax laws would tend to arm the larger firms with bidding advantages, this would not dictate a departure from competitive bidding for these reasons:

First, assuming capital barriers and vertical integration gave the major companies a substantial bidding advantage at lease sales, the consequences would be that the first 20 or so leases would be taken up by that number of integrated oil companies and possibly by large petrochemical companies.³⁵ While this may not approximate the model of perfect competition, it is far from monopoly. The rivalry between that many firms selling the same product from the same geographic locale could provide heavy competitive pressures.

Second, any tax advantage of integration with respect to shale oil would be much less acute than with respect to crude petroleum; yet competitive leasing of federal oil and gas lands is widely practiced.³⁶

35. The 20 largest petroleum companies, as of 1966, are listed in *Antitrust Hearings*, *supra* note 4, at 623.

36. All oil and gas leases for the federal outer Continental Shelf lands are awarded by competitive bidding. 67 Stat. 468 (1953), 43 U.S.C. § 1337(a) (1965). Public lands subject to oil and gas leasing under the Mineral Leasing Act of 1920 are leased through competitive bidding if the lands to be leased are within a known geological structure of a producing oil or gas field. 41 Stat. 443 (1921), 30 U.S.C. § 226(b) (1965). Location, acreage, and production statistics for competitive oil and gas leases issued by the United States are found in United States Bureau of Land Management Public Land Statistics 1966, Tables 50 and 54 at 84 and 87 (1966).

Third, if the tax law results in competitive advantages, but the tax treatment is for other reasons thought to be in the public interest, then the competitive distortion is the price to be paid for the countervailing benefits. If the special tax treatment is not otherwise justifiable, the answer is to change the tax law, not to depart from competitive leasing.

Fourth, alternatives to competitive leasing would not remove the handicaps of the smaller firms, and may create other serious problems.

One alternative is negotiated leasing. That system offers no assurance that the government's compensation will be adequate, or that the lands will go to the most efficient competitors. Opportunities for favoritism and discrimination cannot be avoided, and there is no assurance that the lessees would be other than the largest firms.

A second alternative would be to award each lease to the first applicant, as in the case of wildcat oil and gas leases on public lands.³⁷ That system has resulted in the use of a lottery to award leases because of the administrative difficulties raised by the simultaneous filling of applications.³⁸ Moreover, if there were advantages of size or integration, those with the advantages would tend to take up the wildcat leases by assignments. Thus, the lottery could not overcome any market imperfections which a competitive system could not overcome. In addition, a lottery has no propensity to allocate on the basis of efficiency, or to assure a competitive rate of return to the United States.

A third alternative is for the Government to go into the business of producing and marketing shale oil. In analyzing this proposition, it must be understood that shale oil will have to compete with conventional crude oil in the market place. If the government output were insufficient to affect the price of competing crude oil, the presence of the Government in the market place would have no effect on any existing market imperfections. In short, there would be no point in its presence. On the other hand, if the shale oil output of the Government were large enough to affect the price of petroleum with which it competed; if the price of petroleum were at a competitive level, and if the Government offered its shale oil at less than the competitive price, others would have to lower their prices and some who were efficient enough to have existed at competitive price levels would be driven out of business. In addition, the Government would be subsidizing oil consumption over consumption of competing energy sources, thereby misallocating the use of resources.

37. 30 U.S.C. § 226(c) (1965).

38. Nugent, *Federal Mineral Leasing: A Study of Rule-Making and Market Realities*, 15 Public Policy 34 (1966).

On the other hand, if, but for the government marketing operation, prices would have been above competitive levels, and if the Government were to price its shale oil at what it believed would have been the competitive level, the ones who would suffer most would be those who could not survive at competitive price levels. No misallocation of resources would occur because the consumers would be paying only the competitive price.

It is far from certain, however, that the Government could work its will to price at competitive levels. Assuming the absence of effective competition to begin with, who is to say what the competitive price would have been? An error on the low side would drive out truly competitive firms and subsidize oil consumption over the consumption of other sources of energy, leading to distortions in other markets. An error on the high side would protect uneconomic producers, and leave consumers paying above competitive prices, just as though the facilities were not government-owned.

Even if the Government could divine what the competitive level would have been, there are reasons to question its will to operate at that level. Political pressure could be expected from consumer and producer interests. From time to time the one in ascendancy might prevail to keep prices lower, or higher, than at competitive levels. Moreover, the Government would face inherent conflicts of interest. As an investor in a plant it would tend to want to derive as much revenue as possible from its investment in shale oil production, but as a landowner of vast quantities of oil, gas, coal, oil shale, and uranium lands, producing and potential, with revenues from their leasing and production, it would feel a responsibility not to price its shale oil to deprive itself of those other revenues.³⁹ As administrator of the Oil Import Program⁴⁰ it would tend to exclude products which competed with its own, but as a representative of consumers it would tend to ease import restrictions.

In addition, the freedom to correct an erroneous decision would be seriously impinged once the Government began to market shale oil. The pressure to continue would be immense and the will to offer other lands for competing private development would be undermined. The attractiveness of government land for private investment would be reduced. On the other hand, the ability to correct an error from starting with a competitive leasing test of the market

39. The revenues derived from federal mineral lands are given in United States Bureau of Land Management Public Land Statistics, pt. 3, at 78-91 (1966).

40. Presidential Proclamation 3279 (March 10, 1959), 73 Stat. C25 (1960); 32A C.F.R. Ch. X (1967).

would be great. If private monopoly appeared to be developing, there would still be ample land left to allow for the Government to produce shale oil for the market, and the antitrust laws would still be available to dissipate unlawful monopoly.

Finally, if the handicaps to smaller firms are to be overcome, subsidy within the framework of a competitive leasing system can be utilized. One method would be to set aside certain tracts for bidding by smaller firms. Presumably the prices bid would be lower than the prices which would have been bid by the largest firms—the difference representing the discount in land values needed to compensate the smaller firms for the disadvantages they faced in competing against the large ones. Whether the land itself would have sufficient value to account for any such difference is impossible to predict. The basic question raised—whether the promotion of competition from smaller firms would be worth the land values which the Government yielded—involves policy questions beyond the scope of this Article. It must be noted, however, that if a subsidy to smaller firms were to be provided, the use of competitive bidding for set-aside tracts has the previously mentioned advantages over non-competitive methods of resource disposal.

Another possible method of subsidy would be to allow accelerated depreciation for smaller firms. This could be more attractive to small businesses than a system of set-asides if the benefit were greater than that which could be provided in land value discounts. Like land set-asides, the fast write-off could work within a competitive leasing system.

In sum, the competitive leasing system provides the best opportunity to assure fair returns to the Government and to allocate the resources to the most efficient of those who could bid for them without subsidy, and to the most efficient of those who could bid for them only if subsidized.

Having stated, and I hope demonstrated, why a competitive leasing system should be used, the characteristics of a desirable competitive bidding system should be stated.

First, the lease should minimize any opportunity for holding oil shale lands for speculation. Therefore, the following conditions should be imposed: (a) Leases should terminate automatically if minerals are not produced in paying quantities after a designated period which gives reasonable time for needed exploration, planning, construction, and testing; (b) Leases should provide for high annual rentals which begin to accrue a few years after the lease is issued, but which may be credited against royalties accrued during

the same year;⁴¹ (c) Awards should be made on the basis of cash bonus bidding. If no cash outlay were required, and royalty bidding were used, successful lessees might be tempted to delay investment for a few years, surrender their leases, and try to get new ones at lower rates.

Second, unnecessary business uncertainties tend to reduce the number willing to bid and should be avoided. Thus the size of tracts and the duration of the leases should be specified in advance—the Department of the Interior's proposed research and development leasing program offered on May 7, 1967, for public comment has been much criticized on this account.⁴² Under those proposed regulations the Department of the Interior would issue a number of leases to applicants who demonstrated the capability to engage in oil shale research and development. The leases would have two phases. In Phase I, lasting up to 10 years, the lessee would be required to do research and development work on an amount of acreage the Department decided was sufficient for that purpose. If during that time the lessee demonstrated to the satisfaction of the Department that he had developed a commercial process in accordance with the plan he submitted, Phase II of the lease would begin, to last for so long as minerals were produced in paying quantities. The acreage for Phase II would also be fixed by the Department at an amount necessary for commercial production, plus reasonable reserves. This proposal has been criticized on the grounds that the lessee would face the uncertainty as to whether (a) he could develop a process, (b) the process would be satisfactory to the Department of the Interior, and (c) the process would earn an adequate amount of land. It has been said that each uncertainty is so great as to make the investment uneconomic. Whether or not that may be the case, it is clear that such uncertainties are unnecessary. Leases can be issued for specified acreages and duration without being tied to the success of the research and development efforts of the lessee.⁴³ In addition, if it is thought necessary to make available the technology developed on leased land, that can be accomplished within the framework of

41. The rental provision for oil shale in the Mineral Leasing Act, 30 U.S.C. § 241 (1965) is inadequate for this purpose. It stipulates an annual rental of 50 cents per acre. There are other provisions of the Mineral Leasing Act which deserve a hard look before that Act is used as the vehicle for oil shale leasing, e.g., 30 U.S.C. § 191 (1965), which provides that of the royalty, bonus, rental and other monies received from leasing, 37½ percent goes to the state which the land is located, 52½ percent goes to the Reclamation Fund, and 10 percent goes to the miscellaneous receipts of the Treasury.

42. 32 Fed. Reg. 7086-88 (May 10, 1967).

43. The Department of the Interior no longer advocates the provisional development leases outlined in the Proposed Regulations of May 7, 1967. The Interior Oil Shale Report of May 1968 recommends use of competitive leases for commercial development. *Interior Oil Shale Report*, *supra* note 4, at 128-33.

competitive leasing simply by announcing in advance of lease sales a requirement that technology developed, and background technology necessary to practice the developed technology, must be licensed to others at reasonable royalty rates. The bidders will know in advance that they will forego any opportunity for patent monopoly, and can discount their bids accordingly.

Third, the royalty rate base should not magnify the uncertainties of competitive operation. The royalty base should, therefore, be a percentage of net income rather than gross income. A rate on gross income is a cost of doing business, payable irrespective of the rate of profit. A gross income charge operates to cause production to cease at the point where the royalty cost, plus other marginal costs, equal marginal revenue. This point is reached earlier than it would have been reached if the royalty were not a marginal cost.⁴⁴ In view of the untried nature of oil shale ventures, this added risk of premature termination of production will tend to reduce the number of bidders and the amounts they are willing to bid.

Fourth, the Government should conduct each sale by either sealed bid or oral auction bid, depending upon which is likely to be most effective for the sale in question. Oral auction bidding guarantees that the winner will not receive the award for less than something slightly higher than the second highest bidder was willing to drive him to pay. This is not true of sealed bidding. Under sealed bidding each competitor estimates not only what he can afford to pay but what the others are likely to bid. If each bidder underestimates significantly the amount the others would bid, the winning award could be for less than it would have been if the winner had been required to overcall the next highest bidder at an oral auction. On the other hand, if there are few bidders (or perhaps only one bidder) at an oral auction the winner might find his competition weak or non-existent and get the award at less than he would have estimated it necessary to bid under a sealed bid. In addition, the business risks attendant upon collusion are less under sealed bidding. Those participating in the collusion may have no guaranty against an outsider's bid, and must take account of that possibility in deciding on the price to bid. At oral auction if the conspirators see no outsider they may take full advantage of their collusive arrangements. Sealed bidding is therefore more likely than oral auction bidding to reduce the margin between rigged bid price levels and competitive price levels.⁴⁵

44. Testimony of Professor Walter Mead in *Antitrust Hearings*, *supra* note 4, at 385-86.

45. For an excellent discussion of the question, consult Mead, *Natural Resources Disposal Policy—Oral Auction Versus Sealed Bids*, 7 *Natural Resources J.* 194 (1967).

Fifth, the requirement that a person, corporation, or association may hold only one federal lease,⁴⁶ and the 5,120-acre limitation on total holdings of federal land⁴⁷ should be eliminated after a substantial number of leases have been issued. This will prevent the latecomers from having the bidding to themselves.

Sixth, only one lease should be offered at each sale. Multiple offerings at the same time might reduce the vigor of competition for each tract offered.

Seventh, joint bidding should be prohibited where the joint bidders could have bid independently, because such combines eliminate the competition between the bidders. Joint bidding by those who could not bid independently adds bidders and therefore should be permitted. Since it may be difficult for the Department of the Interior to determine which bidding combines restrain trade unreasonably and which do not, it could seek the advice of the Department of Justice.⁴⁸

CONCLUSION

The absence of a workable and widely available oil shale technology may dictate that the Government engage in research to improve the technology to enhance the value of its holdings before it offers them for leasing. Such a government research program would not preclude private parties from engaging in research on their own lands at the same time. The government research effort, however, should be carried no farther than necessary to create a workable technology and to make it available for practice. If the Government were to go so far as to engage in commercial shale oil production in competition with others, it would discourage the development of a viable oil shale industry and could cause serious market distortions in the oil industry, in industries which produce other fuels, and in fuel-consuming industries.

At the time when a workable technology has been developed, the government oil shale leases should be awarded by competitive bidding. If the oil shale market is not reasonably competitive because of entry barriers resulting from heavy capital requirements or ver-

46. 30 U.S.C. § 241 (1965).

47. *Id.*

48. Donald F. Turner, then Assistant Attorney General of the United States in charge of Antitrust, has indicated that the Department of Justice might participate with the Department of the Interior in the consideration of oil shale research and development consortia. *Antitrust Hearings*, *supra* note 4, at 353-54. The *Interior Oil Shale Report*, *supra* note 4, at 133, states that "To the extent joint ventures inhibit competition, they should be discouraged." The report also suggests consultation with the Department of Justice to develop safeguards to assure competitive bidding.

tical integration, the setting aside of tracts for bidding by smaller firms and the offering of tax incentives to smaller firms are devices which can be used within the competitive system to reduce the margin of advantage of the more favorably situated firms. Even if market imperfections cannot be overcome by special assistance to smaller firms the competitive system should nonetheless be utilized. Noncompetitive leasing leaves open opportunities for favoritism; has no propensity to select lessees in accordance with their efficiencies; and offers no assurance that the United States will obtain fair market value for the resources alienated.