

Senator Moss. What you are saying is that if you get the extraction method worked down to where the oil is competitive, you would shift at once to your policy of making leases for actual production.

Mr. UDALL. The lessee would be able to move to the second stage; that is right.

Senator Moss. But the limitation there is 5,120 acres to any one lessee.

I think you said that about \$15 million would be devoted to *in situ* retorting research. Is that a limiting factor or just an estimate of how much you would develop?

Mr. UDALL. No; this is an estimate, Senator. We laid out this program of Federal research and, of course, it will depend as it always does on what we can get appropriations for. But we felt that in the next 10 years the Federal Government, on its own, ought to pursue certain lines of research. I could have my people give you a presentation on this, and that we hope that we could get congressional support for research on the magnitude that we describe.

Senator Moss. If this were done in conjunction with the Atomic Energy Commission, you would expect to use some of their funds I suppose.

Mr. UDALL. Yes; in fact that amount is folded into the total that we gave you.

Senator Moss. If I remember correctly, you said earlier that there is no objection or impediment to the State moving in if it wants to block up some of its lands or put its lands into private hands in order to conduct separate experiments or make leases for production right now; is that correct?

Mr. UDALL. Yes.

Senator Moss. Well, as the others are, I am pleased that there is some action in this area. It is indeed a very thorny area which presents a lot of problems and, although we should proceed with care, I also think we ought to proceed with a degree of alacrity in getting action.

Mr. UDALL. Well, Senator, I made a conscious decision about a year ago, after my oil shale advisory board report was in and evaluated, that while I was Secretary I wanted to develop a policy, and I wanted to do it so that we could begin action on a sound basis. That is still my objective. We are not trying to create confusion or inaction. We are trying to lay the basis for real action, I can assure you.

Senator Moss. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Hansen?

Senator HASEN. Mr. Chairman, if I may, I would like to ask that my statement before the Hart committee be placed in the record at this point.

The CHAIRMAN. Without objection, it is so ordered.

(The statement referred to follows:)

STATEMENT OF SENATOR HANSEN TO THE ANTITRUST AND MONOPOLY SUBCOMMITTEE
OF THE JUDICIARY COMMITTEE, U.S. SENATE, MAY 5, 1967

Mr. Chairman—and I feel that I can address you in more personal terms than that after the past several weeks of work—let me express my appreciation and the appreciation of my staff for being allowed to participate in these hearings before this Subcommittee. It has been an education for all of us. Let me thank,

also, you Mr. Cohen, you Mr. Chumbris, and you Mr. Bangert for the courtesies and the help that you have extended to us.

I am tempted, as a lawyer might be, to recap these entire hearings, in the manner of a "closing argument," but I'm not a lawyer and I find myself more in the shoes of a jurymen who can scarcely remember the name of the first scheduled witness. So I will refrain from that temptation. I do think that this Subcommittee is to be commended for the excellent record that has been compiled and for the depths which you have explored.

Let me if I may, confine my remarks to several of the major issues and debates, if you will, which I see emerging from the entire record of these hearings. I do hope that the questions I have asked throughout the hearings will, upon reading, be relevant to these major issues.

I view the two major questions that face our Federal government with respect to oil shale development as being "when?" and "how?" I say Federal government because I believe, and I am sure that you would agree, that this is a question which involves not only this Subcommittee, but many Committees of the Senate and House, as well as the entire Congress and several of our major Executive Departments. I say Federal government also because this is a question which does involve all of the people of our country and it is our Federal government which is charged with properly representing our people. Lastly, I say Federal government because I am firmly convinced that without the formulation of a positive development policy on the part of our government we will pass into the 21st century and this resource will remain in the ground where it is of no benefit to our Nation.

Perhaps, Mr. Chairman, you would ask the questions of "when?" and "how?" in the reverse order. But I believe that unless the urgent demand for the formulation of a government policy is made clear to the country, no one will ever bother to seriously consider the "how."

Secretary Udall testified before you, but unfortunately neither the Subcommittee nor the Secretary had the benefit of his Department's proposed leasing program which was still being formulated for the Secretary's approval. Last week the Secretary indicated that this proposed program was nearly ready to present to the Congress and to the public for scrutiny and for comment, suggestions and objections from all quarters. I am hopeful that this tentative program will be released before the end of this week. That would then bring us to the question of "how?"

I am sure that the Subcommittee would agree that any debate on a matter so large as public vs. private development of this resource would extend far beyond the bounds of this Subcommittee's purview. My strong faith in the merits of the private enterprise system does not need to be repeated here. If this resource is to be developed by private enterprise, and I see no reason why it should not, or, indeed, how it could be developed otherwise, then I believe that you and I, Mr. Chairman, are in basic agreement on the need to foster healthy competition in this new industry.

I agree that this Subcommittee's principal concern should be to encourage the entry of as many parties as possible into this new industry. This simplification is qualified, of course, to the extent that the industry must pass through a variety of stages, not all of which can be foreseen at this time. I would emphasize my use of the word "possible" while taking into account the high cost of entry if it proves that shale oil can only be produced by traditional mining and above ground retorting techniques. In addition, it is obvious that any entrant into the field of commercial shale oil production must first be prepared to sustain a major long-range research and development program.

Further, I would remind this Subcommittee, as I have tried to do often throughout the conduct of these hearings, that it is not enough to speak merely of competition among participating parties in an oil shale industry. We must recognize, and by we I mean all of the American people, that on this matter the United States is in competition with the world. As has been pointed out to the Subcommittee, the province of Alberta, Canada, will be pumping crude oil from the Athabaska Tar Sands into United States and world markets by September of this year. In my maiden speech on the Senate floor, which is a part of this record, I tried to outline some of the dangers which flow from this country's reliance upon foreign sources of oil.

It is not a matter to be taken lightly, that the only private company in the United States which now expects to have a 50,000 barrel a day shale oil operation

on line by 1970, almost fell into the control of the French government less than a month ago. I am speaking of The Oil Shale Corporation whose representative Mr. Winston has recently testified before this Subcommittee.

I suggest to the Subcommittee that the most pressing questions before the Congress are not questions of "why" or "why not" certain companies have sought to develop our oil shale resources. I am afraid that it is as idle for us to speculate about various corporate decisions, both past and future, as it is to ask each other how many angels will dance on the head of a pin. The more pressing question before all of us is how we might promote the development of this resource. The questions which I believe the Chairman has ably raised concerning the constructive effects competition could play during the process of this promotion are, I believe, valid and necessary questions in the context of the greater dialogue. But let us not become so preoccupied with discussing the potential for monopoly in an industry which as yet does not even exist that such an industry is forever discouraged from setting its tender feet into the swim of the market place. I was tempted to say, "let's not throw the baby out with the bathwater." But that doesn't fit. As yet, the baby hasn't even been allowed to get into the bath.

I submit to this Subcommittee that we will be doing a great national disservice if government regulation in the name of "antitrust" serves to prohibit the emergency of a new industry in this area. Such a course, instead of stimulating competition, would prevent it. That would indeed be a Pyrrhic victory in the name of some confused and doctrinaire ideological cause.

Senator Hruska has brought my attention to an excellent article by Max Ways which appeared in *Fortune* Magazine in 1966 and again in 1967. Mr. Ways, in the article entitled "Antitrust in an Era of Radical Change", discusses the debilitating effect of reactionary and out-dated antitrust policy. If I may quote him he says, "But this thing, as they used to say in Hollywood, is bigger than all of them. The reactionary side of antitrust has a momentum that is built into court decisions, congressional investigations, and the cliches of public discussion . . . The place to clarify a fundamental national policy is Congress."

In discussing the course of our future policy Mr. Ways had this to say:

"We cannot know that the future requires big corporations, any more than we can know it will be best served by small ones. We can know that the future requires innovation and flexibility and that the market, including the merger market, provides a better framework for them than central government planning would. We have three choices: we can substitute planning for the competitive market; we can keep the market, while distorting its action by government intervention on the false premise that the vigor of competition is determined by the number and size of competitors; or we can recognize that we are moving, year by year, into a more truly competitive and more innovative society in which we will not need and cannot afford the restrictive side of antitrust."

Many witnesses who have testified in these hearings expressed particular concern for the research and development phases of many contemplated leasing procedures. In some of his earlier remarks, the Chairman drew certain analogies between oil shale development and the development of a needed national weapons and space system. With that analogy I cannot agree. A look at the history of this country's free enterprise system would hardly lead one to believe that massive government involvement in research and development has been a "tried and true" method except in extreme situations which often have involved a national emergency. Indeed, I believe my principal difference with the Chairman throughout these hearings comes on this point.

We have before us a technological problem—how to get oil and other possibly valuable associated minerals out of oil shale through a commercial process which renders these products valuable in the market place. Up until the present time, we know that the chief problems in this illusive competitive process will be questions of mining and chemistry. In neither of these areas does our Federal government have any particular competence. Indeed, the competence, and I might add genius needed for this development lies within the private sector.

I believe that for this industry to properly develop we will see the dramatic formation of new corporations. These new figures on our private industry scene must be prepared to put together a variety of capabilities—in mining, in chemical engineering, in solid waste disposal and in the, as yet undefined, capability to derive high value from the newly recognized aluminum bearing carbonates. The combination of these capabilities, I believe, can only come from a responsive and innovative private sector.

The government does, however, have a clearly defined responsibility for research in its role as landlord. That responsibility is to determine by core drilling and by other geologic exploration methods the nature and the extent of the resource which lies below its lands.

As so many people have pointed out to me since these hearings began, it would be both uneconomical and ineffectual for the government to go beyond that and to attempt in its own right to develop a technology for the commercial production of oil shale and associated minerals. This Subcommittee has heard testimony on the variety of techniques which might be used to achieve commercial production. Further, it should be clear that the "pay dirt" in oil shale will not be hit through one "break through" but rather will require in all probability a number of break-throughs on a number of fronts. For any one company to successfully pursue any one technique will obviously require a continued research and development effort. Research, like education, never stops. It must always continue to keep pace in the competitive market place.

I think that it is also clear whenever new technology must be developed that the end product of that technology is of less importance than the presence of a sustained cadre of men and women dedicated both to the development of the technology and its application. The suggestion that the Federal government assume the role of a technological innovator completely overlooks this fact. Technology, without the presence of trained people, would be meaningless. It would be idle and wishful thinking to believe that the Federal government could produce all of the technological keys necessary for the unlocking of oil shale and then at some given point in time deliver over the keys to a private company adjudged "qualified" by the government. I submit that the results which I believe all of us seek could never be achieved in that fashion.

A review of the record developed by this Subcommittee reveals that it has been parties other than the Federal government which have so far brought the greatest progress to oil shale development. The excellent testimony of Professors Mead and Steele have been most constructive in developing an informed record before this Subcommittee. Those gentlemen have done their work completely outside the ambit of federal jurisdiction. Further, as I have tried to show in the record, the significance of dawsonite has only been brought to light through the efforts of private individuals who sought specifically to find value in the vast western oil shales other than the possible value of the known oil contained in those shales. The genius of these men is that they focused the attention of the world on a mineral which lay intermixed in federally owned oil shales but had been completely overlooked by the Federal government for the past 50 years. In addition, it has been a small and independent company which testified before this Subcommittee to the effect that it intended to be the first commercial producer of shale oil in this country.

In closing, Mr. Chairman, let me say that I sincerely hope that the loose talk over the value of this resource has been somewhat clarified. Arithmetical differences, which Senator Douglas and I obviously have, aside, let me quote Charles Stoddard, former Director of the Bureau of Land Management, in his testimony before you when he said "unless we have operating experience to show the difference between the costs of this resource and its market price it is impossible to determine a value." All values which have been broadly discussed before this Committee and in the newspapers across the land are but conjecture.

Senator Allott, much better than I, placed before this Subcommittee correct testimony concerning the "possible" value to the nation of this resource. I hope that those who would lead people to believe that our national debt could be dissolved in shale oil will desist from spreading such inaccuracies.

I deplore the references to "scandal" and "giveaway" which has appeared in both our congressional investigations and in editorial comment by certain newspapers across the land. To resort to such innuendo is, I believe, as scandalous a misuse of public debate as any alleged scandal which might be conjured up.

Mr. Chairman, your Subcommittee has performed a great service in sponsoring public debate on the oil shale question. This is a public issue. I also commend Secretary of the Interior Udall, and his Deputy Solicitor, Mr. Weinburg, for their candid comments with respect to the public nature of this issue.

Some have made the charge that the public has been "uninformed." My direct answer is that it is the responsibility of the politician and of our press to inform the people of this country. But this mandate gives us no license to "misinform." I hope that misinformation will not be resorted to in the future.

If we are agreed, Mr. Chairman, that our oil shales and associated mineral deposits are a potential national asset, then I think it must follow that the development of these resources should be promoted as soon as possible. As I have said before, our failure to develop these resources would be a great national loss. To discuss the antitrust implications of an undeveloped resources would mark us in history as so many idle talkers. We have waited almost 50 years for the formulation of a national oil shale policy. I am hopeful that the Secretary of the Interior's proposed leasing regulations will be the first step in a series of many leading toward eventual development of this resource. I am hopeful that we in the Congress can help our private enterprise system get on to the task at hand.

Senator HANSEN. I would also like to ask that a law review article entitled "Oil Shale—The Need for a National Policy," which appeared in volume 2, No. 1, 1967, in the *Land and Water Law Review*, be printed at this point in the record.

The CHAIRMAN. Without objection, it is so ordered.
(The article referred to follows:)

[From the *Land and Water Law Review*]

OIL SHALE—THE NEED FOR A NATIONAL POLICY

(By David D. Dominick*)

(This student article, which won the Rocky Mountain Mineral Law Foundation Prize for research and scholarship in 1966, is presented to express a viewpoint concerning the importance of the vital natural resource of oil shale and its proposed development. The author outlines in detail the past and current situations with respect to the development of this resource and submits that there is no federal policy concerning oil shale development. Mr. Dominick presents a comprehensive analysis of the many problems Congress will have to consider when it takes up the task of establishing leasing procedures for the future commercial development of federal oil shale lands.)

INTRODUCTION

"Oil Shale!" is a cry that is firing the imaginations of many people today. It is a cry not unlike that of the forty-niners who staked their hopes on the promise of "gold in them hills" over a century ago. Both cries remind us that it is America's natural resources which have made her the wealthiest nation in the world.

Oil shale has come to represent a special hope for the people of Colorado, Wyoming and Utah. For in these three states lies a tremendous, but as yet unused, natural resource. By some estimates there are 1.5 trillion barrels of oil located in the Green River Formation of Colorado alone. It is estimated that 280 billion barrels of oil¹ could be recovered from the richer Colorado formations by using present technology. Compare this to the other known reserves of crude oil—31 billion barrels—in the United States. The potential value of shale oil is indeed staggering. Recoverable oil in the shale deposits of the Green River Formation has been valued at \$2,577,000,000,000.²

Yet development of this resource is still only a hope. A century ago the forty-niners sought their gold free from any government direction or control. At that time the "free-miner" tradition prevailed. But today a full-scale oil shale industry cannot come into being without the formation of a national policy permitting the commercial leasing of federal oil shale lands. Approximately 72 per cent of the oil shale acreage in Colorado is in the federally owned public domain, and this federal land contains the richest portion of the Green River For-

¹ "Shale Oil: From Potential to Production," Speech by C. E. Reistle, Jr., chairman of the Board, Humble Oil and Refining Co., before the 95th annual meeting, AIME, New York, N.Y., March 1, 1966.

² OIL AND GAS JOURNAL, p. 65, March 9, 1964.

*Legislative Assistant for Milward L. Simpson, U.S. Senate, Washington, D.C.; B.A. 1960, Yale University; J.D. 1966, University of Colorado; member Wyoming and Colorado bars.

mation, containing approximately 85 per cent of the formation's known oil shale reserves.³ Because of the great expense of entry into this new industry, private enterprise needs some assurance that these reserves will be made available for commercial development. Thus, the federal government holds the key to unlocking the benefits of this great resource.

Oil shale has recently received increasing attention in the press,⁴ in the courts,⁵ and in Congress.⁶ Such attention is even reaching the proportions of sensationalism. In the first session of the present 89th Congress Senator Douglas of Illinois introduced a measure which read: "A Bill to Retire the National Debt with Royalties from Publicly-owned Oil Shale Land."⁷ This proposal has predictably enraged many in the western states.⁸

As a result, there is an increased public awareness that, while this natural resource awaits development, clearer and clearer battle lines are being drawn between "Big Business" and "Big Government." Representatives of the petroleum, mining and chemical industries are asking that private enterprise be given the opportunity to develop oil shale.⁹ Others suggest that oil shale should be developed, if at all, by a governmentally owned and operated monopoly.¹⁰

The federal oil shale lands are presently under the administration of the Department of Interior. Disposition and leasing of these lands could be done today by the Secretary of Interior. But the prospects for such affirmative action by him are poor. "Delay" has been the only recognizable "policy" to come out of the Interior Department in years.¹¹

³ Estimates vary as to the proportion of federal ownership depending upon the geographic limits used in defining the Green River Formation. John B. Tweedy, counsel for The Oil Shale Corporation (TOSCO), (speaking at the University of Colorado Law School in November, 1965) estimates that 64% of the surface containing 84% of the oil reserves of the Green River Formation lies in the Public Domain, with 21.8% of the surface containing 10% of the reserves on patented lands, and 13.5% of the surface containing 4.9% of the reserves on unpatented and presently contested lands.

In Senate Hearings it was claimed that approximately 70% of the deposits in the Green River formation, containing some 80% of the oil is on land owned by the Federal Government. *Hearings on Oil Shale Before the Senate Committee on Interior and Insular Affairs*, 89th Cong., 1st Sess. 3 (1965).

The Department of Interior, reporting on the oil shale policy problem said: "To date, investigations of Utah's oil-shale deposits have not been nearly as comprehensive as those of the Colorado deposits, and the deposits in Wyoming have been explored least of all."

"Of the entire 1,300,000 acres of land in the oil-shale area in Colorado, 582,000 acres (including Naval Reserves) are federally-owned, 380,000 are privately-owned, and 338,000 are lands in unpatented mining claims. Approximately 1,000,000 acres are underlain by oil-shale deposits and the remainder is contiguous non-shale bearing land, principally the areas of stream valleys between oil-shale outcrops. Virtually all of the central portion of the Piceance Creek Basin is federally-owned land. Federal oil shale averaging at least 25 gallons per ton and 15 feet or more thick probably average about 1,000 feet in thickness, where the shale of this grade on privately-owned land probably averages a little over 100 feet."

"Of this previously mentioned 1.3 trillion barrels of oil in deposits containing 10 gallons or more of oil in the Piceance Creek Basin the privately-owned oil shale represents about 100 billion barrels of shale oil and the unpatented mining claims represent about 100 billion barrels. The remaining lands are federally-owned and contain deposits of about 1.1 trillion barrels in place. Based upon a shale grade of 25 gallons per ton the oil potential would be half of these quantities."

DEPT. INTERIOR SYNOPSIS, *THE OIL SHALE POLICY PROBLEM 21-22* (1964).

⁴ Duschka, "Bonanza in Colorado—Who Gets It?" *Atlantic Monthly*, Mar., 1966.

⁵ The legal status of unpatented and administratively contested oil shale claims made under the Federal mining laws is being adjudicated in several cases presently pending before Judge Doyle of the Federal District Court, Denver, Colorado. The principle "test" case is *The Oil Shale Corp. v. Udall*, Civil Docket No. 8680, which is now in the pre-trial stage. This case, along with numerous similar ones accompanying it in the District Court, seeks a mandamus directing the Secretary of the Interior to discharge his duties under the Mineral Leasing Act of 1920 and to withdraw invalid administrative decisions cancelling rights to, or denying patents to, unpatented claims. Alternatively the plaintiffs seek a declaratory judgment interpreting the mining laws. Defendant's motion to dismiss has been denied. See also, Reidy, *Do Unpatented Mining Claims Exist?*, 43 *DENVER L.J.* 9 (1966); and Lohr, *Conclusiveness of United States Oil Shale Placer Mining Claims Patents*, 43 *DENVER L.J.* 35 (1966).

⁶ 112 CONG. REC. 4901 (daily ed. Mar. 7, 1966) (remarks of Senator Dominick). Also, *Senate Hearings on Oil Shale*, supra note 3.

⁷ S. 2708, 89th Cong., 1st Sess. (1965).

⁸ Wyoming State Tribune, Oct. 25, 1965 (editorial), p. 5.

⁹ Reistle, supra note 1.

¹⁰ Duschka, supra note 4.

¹¹ See *Senate Hearings on Oil Shale*, supra note 3, at 36. See Ely in *Conservation of Oil and Gas*, ABA SECT. M & NRL 303 (Sullivan ed. 1958). See also, *The Denver Post*, Mar. 20, 1965, "The Dispute Over Oil Shale," p. 9, where James H. Smith, Jr., of Aspen, Colorado, a nationally recognized leader in economic development, decries the delay in the development of oil shale.

It is this writer's opinion that such delay should no longer be condoned and that a national oil shale policy should be formulated as soon as possible. But the public would be foolish to hope and expect that such a policy will ever be forthcoming from the Executive Branch of the federal government, in general, or from the present Administration, in particular. Rather, oil shale is a problem for the legislature. It is Congress which now holds the key to oil shale development.

This paper will examine the role of the federal government in the formulation of a national oil shale policy. The formulation of any such policy now, however, must take into account past events and past policies. In this regard, Part One of this paper will be a historical review of government control in the petroleum industry as a whole. Then, Part Two of the paper will describe the oil shale situation as it presently exists and will outline the various questions of policy which must be considered by Congress.

Some of these questions concerning the future of oil shale are extremely complex and have proved difficult even to define in the past.¹² But this problem is aggravated by the fact that many who have successfully opposed¹³ oil shale development in the past have never been required to make public the real reasons for their opposition. To date, those who favor oil shale development have been only able to guess at the possible rationale of their opponents. This paper attempts to force any such rationale into the open.

Perhaps those who have inhibited oil shale development thus far—while preaching the “new economics”—have actually feared that to move ahead with this resource development would be to dangerously “rock the boat.” Perhaps they fear upsetting the uneasy balance between “Big Business,” particularly as represented by the petroleum industry, and “Big Government” as it is being practiced by the present Administration. Perhaps the opponents fear that the creation of a private oil shale industry might weaken the government's present attempts to assume more and more control in such areas as the oil import program, anti-trust and interstate commerce regulation, and federal land control.

But in each of these areas, the exercise of federal power cannot be justified simply for its own sake. Policy can only be formed after an examination of the merits. Those advocating the development of oil shale should be given the opportunity to show that such resource utilization, under proper government regulation, would be in the best interests of the nation. Those who propose such development by private enterprise have a right to demand good reasons from their opposition, on a point-for-point basis, why such development should not proceed. The burden now should be shifted to those who would obstruct oil shale development.

There are those who have been critical in the past of the petroleum industry as a whole.¹⁴ But such antagonism should not be allowed to prevent the birth of a new industry. Therefore, it should be kept in mind that an oil shale industry, if and when it is allowed to come into being, will be a “new business.” And while problems will be cited in Part One which have traditionally plagued the federal government in its efforts to regulate the petroleum industry in the past, the government now has an opportunity to create original answers with regard to a new oil shale industry. If there is cooperation between the representatives of private industry and the Department of Interior in seeking these answers, then Congress will be greatly aided in its future policy formulations.

PART I—A HISTORICAL REVIEW OF GOVERNMENT CONTROL IN THE PETROLEUM INDUSTRY

The petroleum industry (the natural gas industry will not be discussed in this paper) is unique among the major businesses of this country in that it has enjoyed comparative freedom from direct federal regulation. In the first place, federal anti-trust legislation has had little restrictive effect upon the exploration, production and refining phases of the petroleum industry (although retailing of oil products has come under some anti-trust litigation in recent years). Secondly, the domestic production of crude oil has been regulated by so-called “conservation statutes” of state, rather than federal, government. And finally, special note should be taken of the fact that less than 5 per cent of the petroleum produced in this country has been subject to the federal mineral and land laws.

¹² Mock, *The Oil Shale Advisory Board*, 43 DENVER L.J. 47, 70 (1966).

¹³ See Duschka, *supra* note 4. See also the *Individual Views* of J. K. Galbraith in the INTERIM REPORT OF THE OIL SHALE ADVISORY BOARD TO THE SECRETARY OF THE INTERIOR 20 (Feb. 1965) (transmitted by letter of chairman, Joseph L. Fisher, Feb. 15, 1965). Reproduced in this issue of the REVIEW *supra* p. 50.

¹⁴ Galbraith, *Individual Views*, INTERIM REPORT OF THE OIL SHALE ADVISORY BOARD, *supra* note 13, at 21, 22.

On the other hand, the federal government is imposing very important indirect controls over the petroleum industry through the exercise of its national defense and foreign commerce powers.

Part One of the paper will discuss all these forms of government control in the belief that each must be considered by Congress in the formulation of any future oil shale policy.

It should be remembered that none of these controls are absolute and all are subject to change. Therefore, the problems of federalism will also play a part in any policy considerations. Relationships between state and federal governments and between private industry and these governments must always be taken into account. Critics of the petroleum industry argue for increased federal control over that industry in the future. On the other hand, oil-producing states have resisted such a move and seek to preserve the regulatory powers which have been traditionally reserved to them. These problems of federalism will be of great significance to an emerging oil shale industry.

A. Federal versus State powers

1. Federal anti-trust regulations

The early history of the oil industry was marked by severe competition. Large combinations exercised a monopolistic control through their ownership of refineries and oil pipelines. Finally, the great Standard Oil Trust of John D. Rockefeller was dissolved by Sherman Act prosecution in 1911.¹⁵

Since that time, there has been only minimal anti-trust regulation over the exploration, production and refining phases of the petroleum industry.¹⁶

2. Demand estimates and production control under State "conservation statutes"

As was indicated at the outset of Part One, the production of crude oil is presently being controlled by state governments.¹⁷

It is due to what some describe as an "unfortunate legal accident" that President Coolidge was stymied in 1924 in his attempts to establish a Federal Oil Conservation Board. For during the early stages of the development of the oil industry it was an accepted constitutional principle that the production of oil¹⁸ lay outside the purview of the interstate commerce clause of the federal constitution. Meanwhile, and as early as 1914, oil-producing states had passed prorationing conservation statutes which in the decades that followed underwent a stormy history of attempted enforcements and evasions. These state statutes provide that production quotas may be placed on the oil wells of a state. The production quotas are set on the basis of estimates of demands, and for this reason critics have labeled the proration system as being nothing short of "administrative price fixing." Nevertheless, in 1932, the Supreme Court overruled lower federal court injunctions against the enforcement of these state statutes and declared in *Champlin Ref. Co. v. Corporation Comm'n*¹⁹ that state pro-

¹⁵ Standard Oil Co. v. United States, 221 U.S. 1 (1911).

¹⁶ In the 1950's, some vertically integrated major oil companies were obliged to accept consent decrees which were based on charges of violations of both sections 1 and 2 of the Sherman Act at all levels of the companies' operations. On the production levels the decrees generally enjoined "the operation of agreements among the consenting defendants to control crude production for the purpose of fixing prices, and similar agreements among themselves fixing prices to be paid for crude oil or charged for refined products." *United States v. Standard Oil Co. of California*, Civil No. 11584-C, S.D. Cal., May 12, 1950; *United States v. Standard Oil Co. of California*, TRADE REG. REP. (1959 Trade Cas.) ¶ 69399 (S.D. Cal. June 19, 1959).

¹⁷ The most recent Congressional approval of the Interstate Oil Compact is to be found in Pub. L. No. 86-143, Aug. 7, 1959, 73 Stat. 290 (1959).

¹⁸ By contrast, the natural gas industry did not begin to flourish until World War II, at which time it was held—from its inception—to be subject to the Interstate Commerce power of the federal government. That power has served to make the natural gas industry one of the most heavily regulated enterprises of the present day. A discussion of this regulation, and of the many acts and cases by which it has been imposed, is beyond the scope of this paper.

¹⁹ 286 U.S. 210 (1932).

rationing statutes were constitutional.²⁰ Since that time the courts have universally upheld the statutes as legitimate "conservation" measures.²¹

A federal measure instituted under N.R.A. and serving to enhance the enforcement of state production control was the provision for "forecasts of demand." Initially a Petroleum Administration Board, partially composed of representatives of the industry, advised the Secretary of Interior of demand forecasts. Later the Bureau of Mines, itself within the Department of Interior, began to make these forecasts. This picture is continued to this day.²² Neither the monthly nor annual forecasts of the Bureau of Mines possess authority²³ binding on state production-control agencies, but they are helpful and are given considerable weight by state authorities in setting their production quotas.

3. The critics

Economists, legal scholars and political commentators have been outspoken critics of the present system of production control under state "conservation statutes." Eugene Rostow, former Dean of the Yale Law School, claims that the Bureau of Mines forecasts of demand [and the state quotas which follow from it] depend on a concealed premise of price stability. Their effect is to state how much or how little crude oil need be produced to permit prices to remain fixed.²⁴ Rostow asserts that such demand estimates work like the statistical service condemned in the *Sugar Institute*,²⁵ *Maple Flooring*²⁶ and *American Column & Lumber*²⁷ anti-trust cases. Rostow proposes a total "reorganization" of the oil

²⁰ The Court upheld the Oklahoma market demand statute, attacked as repugnant to the due process and equal protection clause, as a reasonable exercise of the state police power to prevent unnecessary loss, destruction, or waste.

One of the most outspoken critics of the oil industry as a whole, and of national policies concerning it, has been Eugene Rostow in his book *A NATIONAL POLICY FOR THE OIL INDUSTRY* (1948). At page 29 of his book Dean Rostow calls the conservation premise upon which the *Champlin* case rests as "entirely untenable."

Nevertheless, as late as 1950, the Supreme Court has been unmoved by such a point of view as advocated by Rostow. In *Cities Service Gas Co. v. Peerless Oil & Gas Co.*, 340 U.S. 179 (1950), the Court dismissed the due process and equal protection issues in a case involving natural gas, stating as follows:

"It is now undeniable that a state may adopt reasonable regulations to prevent economic and physical waste of natural gas. This court has upheld numerous kinds of state legislation designed to curb waste of natural resources and to protect the correlative rights of owners through ratable taking, . . . or to protect the economy of the state. . . . These ends have been held to justify control over production even though the uses to which property may profitably be put are restricted. . . .

"Like any other regulation, a price-fixing order is lawful if substantially related to a legitimate end sought to be attained. . . . In the proceedings before the Commission in this case, there was ample evidence to sustain its finding that existing low field prices were resulting in economic waste and conducive to physical waste. That is a sufficient basis for the orders issued. It is no concern of ours that other regulatory devices might be more appropriate, or that less extensive measures might suffice. Such matters are the province of the legislature and the Commission."

Id. at 185-86.

²¹ For instance, Wyoming's Oil Conservation Law enacted in 1951 reads as follows:

"It is not the intent or purpose of this law to require the pro-ration or distribution of the production of oil and gas among the fields of Wyoming on the basis of market demand. This act shall never be construed to require, permit or authorize the commission, the supervisor, or any court to make, enter, or enforce any order, rule, regulation or judgment requiring restriction of production of any pool or of any well to an amount less than the well or pool can produce in accordance with sound engineering practice."

Wyo. STAT. § 30-229 (1957).

²² In addition, the Bureau of Mines was directed by the Presidential Proclamation of March 12, 1959, to provide the Oil Import Administration with periodic forecasts of domestic demand and production to assist the Administration in establishing import quotas. 24 Fed. Reg. 1781.

²³ Indeed, such critical writers as Rostow (see note 20 *supra*) claim that "the Bureau of Mines estimates, the keystone of the entire plan, are without support in substantive legislation. No statute prescribes standards or policies for guiding the agency in its determinations of permissible supply." Rostow, *op. cit. supra* note 20, at 29.

²⁴ Rostow, *op. cit. supra* note 20, at 27. Compare this charge to the language of the Interstate Oil Compact, Article V:

"It is not the purpose of this compact to authorize the states joining herein to limit the production of oil or gas for the purpose of stabilizing or fixing the price thereof, or create or perpetuate a monopoly, or to promote regimentation, but is limited to the purpose of conserving oil and gas and preventing the avoidable waste thereof within reasonable limitation."

²⁵ *Sugar Institute, Inc. v. United States*, 297 U.S. 553 (1936).

²⁶ *Maple Flooring Mfgs. Ass'n. v. United States*, 268 U.S. 563 (1925).

²⁷ *American Column & Lumber Co. v. United States*, 257 U.S. 377 (1921).

industry by Sherman Act prosecutions aimed at dissolving oil "monopolies" on both horizontal and vertical planes.²⁸

Writing in 1959, economists Melvin de Chazeau and Alfred Kahn are generally of the same view.²⁹ They note that the Texas Railroad Commission in arriving at its production quotas anticipates imports and oil produced in states without production controls. "By thus allowing for estimated supplies beyond its jurisdiction, Texas, in effect, brings the total available supply, including imports within the principle of prorationing to market demand."³⁰

On the other hand, Ralph Cassady concludes from his lengthy study of price making and price behavior in the petroleum industry that price competition, while not "perfect," is sufficiently keen at all levels of the industry.³¹ In this he follows Professor Bain, who wrote between 1944 and 1947.³² Zimmerman³³ takes a middle position and advocates much less drastic reforms in the area of conservation regulation than is proposed by de Chazeau and Kahn³⁴ or by Rostow.

Before it can formulate any policy for the development of oil shale, Congress should examine the conflicting points of view of these various writers and make its own finding of how best to regulate oil production in this country. Future supply and demand estimates for oil will be one set of crucial questions facing Congress. Further, it must receive some estimates of the quantities of shale oil which could be phased harmoniously into the future domestic supply stream. With these figures before it, Congress must ask: "What effect, if any, should the present system of production control have upon the production of shale oil?" The question might be asked more explicitly: "Should the Texas Railroad Commission be permitted to retain its position of power with respect to production control once oil shale is introduced into the domestic market?" Perhaps Congress will determine that the present system of production control should remain in effect and that the Texas Railroad Commission should be permitted to count shale oil simply as another source of supply—like imports—in arriving at its demand estimates. Perhaps Congress will decide that the development of oil shale, and other factors, now necessitate some of the reforms advocated by the critics of the present system and that the time has come for federal, rather than state, control of domestic oil production.

All these are questions which only Congress can properly answer.

B. The Federal Government as landowner

1. Land laws in chronology

In discussing the exercise of the government's powers in its capacity as landowner, it will be most convenient to present those land laws relevant to oil shale in a chronological order.

1780. The Continental Congress of 1780 created the "public domain" by a resolution which read that:

"The unappropriated lands that may be ceded or relinquished to the United States, by any particular states . . . shall be disposed of for the common benefit of the United States, and be settled and formed into distinct republican states, which shall become members of the federal union, and shall have the same rights of sovereignty, freedom, and independence as the other states. . . ."³⁵

One of the many compromises made by the confederating states was their agreement to relinquish their western territorial claims to the new United States. Thus they created the public domain and provided the federal regime with a source of revenue to pay for the Revolutionary War. Later, the territorial boundaries of the United States were to be completed by additions to the public domain through purchase, treaty and conquest.

1788. Article IV, Section 3, Clause 2 of the Constitution vests Congress with the power "to dispose of and make all needful Rules and Regulations relating to the Territory or other Property of the United States."

²⁸ ROSTOW, *op. cit.* *supra* note 20, at 123.

²⁹ DE CHAZEAU & KAHN, *INTEGRATION AND COMPETITION IN THE PETROLEUM INDUSTRY* (1959).

³⁰ *Id.* at 123.

³¹ CASSADY, *PRICE MAKING AND PRICE BEHAVIOR IN THE PETROLEUM INDUSTRY* 334 (1954).

³² BAIN, *THE ECONOMICS OF THE PACIFIC COAST PETROLEUM INDUSTRY* (1944-47).

³³ ZIMMERMAN, *CONSERVATION IN THE PRODUCTION OF PETROLEUM* (1957).

³⁴ They advocate federal legislation requiring mandatory utilization. DE CHAZEAU &

KAHN, *op. cit.* *supra* note 29.

³⁵ 18 JOURNALS OF THE CONTINENTAL CONGRESS 915 (Ford & Hunt ed. 1904-37).

Any rights, therefore, to oil or mineral deposits located within property owned or controlled by the federal government may be acquired only pursuant to legislation enacted by Congress.

1872. The Mining Act of 1872³⁶ codified pre-existing local mining customs and allowed an outright federal grant of title to mineral-bearing lands by fee simple patent.

1897. In 1897 "an Act to authorize the entry and patenting of lands containing petroleum and other mineral oils under the placer mining laws of the United States"³⁷ made it clear that petroleum was a locatable mineral, and until 1910 thousands of acres in California, Wyoming and other western states were patented as a result of petroleum discoveries. However, the general mining laws were ill suited to the proper development of the oil industry and contributed to its instability in the early stages. Under these laws the common law rule of capture, coupled with the legislative demand for discovery, acted as a stimulant to excessive and wasteful production of petroleum.

1910. Conservation sentiment was on the upsurge during President Taft's administration, and in 1909 most of the remaining public domain was withdrawn by Executive Order from petroleum entries under the mining laws. These withdrawal orders were confirmed by the Pickett Act of 1910.³⁸

1920. During the decade that followed President Taft's withdrawal orders conservationists struggled with those representing the "free-miner" tradition in an effort to develop a federal petroleum land policy. The result was the Mineral Leasing Act of 1920³⁹ which represented compromises from both sides. The 1920 Act represented a radical policy shift from the outright granting of title to federal lands and minerals by fee simple patent to a policy which allowed the development of federal lands under a lessor-lessee relationship. Nevertheless, in retrospect the Mineral Leasing Act does show a legislative intent to allow for the development of petroleum by private industry. The Act likens the federal government to any other private owners of minerals who grants an oil and gas lease on his lands, and it contemplates that leasing and development will be by private, rather than public, hands.

A paradox exists, however, for despite the large acreage of the public domain available for leasing under the Mineral Leasing Act, petroleum production from these lands has rarely exceeded 5 per cent of the total production of the United States. Federal land and mining law has never, therefore, been a critical factor in the major problems of conservation and marketing, discussed earlier, confronting the petroleum industry in the past.

Northcutt Ely comments:

"Most of the important discoveries of hard minerals have been made on land belonging to the Federal Government . . . not so as to oil and gas. By a queer combination of historical and geographical accidents, the major discoveries of petroleum and natural gas have been on lands that were never federally owned [in Texas] or on lands that had passed from federal to private ownership, without a reservation of minerals, prior to discovery".⁴⁰

But the paradox has come full circle, for while lands covered by the Mineral Leasing Act produce only a minimal amount of petroleum today, the oil shale deposits of the Green River Formation in Colorado, Wyoming and Utah, lie almost wholly⁴¹ under federal lands and are explicitly subject to Section 21 of the original Mineral Leasing Act.⁴² Thus the federal government in its capacity as "landowner" will determine the future fate of oil shale.

1930-1966. On April 15, 1930, President Hoover issued Executive Order 5327, which withdrew designated lands containing deposits of oil shale from further leasing under the Mineral Leasing Act and "temporarily" reserved these lands for the purpose of "investigation, examination, and classification."⁴³ Whatever purpose President Hoover may have had in mind when issuing the order in 1930 is not now clear. But the fact remains that this "temporary" withdrawal order remains still in effect today, having prohibited for over 35 years the leasing of federal lands containing over 80 per cent of the known oil shale reserves in this country.

³⁶ REV. STAT. § 2319 (1875), 30 U.S.C. § 21 (1964).

³⁷ 29 Stat. 526 (1897), 30 U.S.C. § 101 (1964).

³⁸ 36 Stat. 847 (1910), 43 U.S.C. § 141 (1964).

³⁹ 41 Stat. 437 (1920), 30 U.S.C. § 181 (1964).

⁴⁰ ELY, MINERAL TITLES AND TENURE, ECONOMICS OF THE MINERAL INDUSTRIES 108 (1959).

⁴¹ See note 3 *supra*.

⁴² 41 Stat. 445 (1920), 30 U.S.C. § 241 (1964).

⁴³ 43 C.F.R. 405 (1930).

2. Recent development in petroleum leasing policy

While leasing of federal oil shale lands has been foreclosed by Executive Order 5327, recent developments in petroleum-leasing policies in other areas are worthy of note. Some may suggest possible examples to be followed for oil-shale leasing in the future.

Multiple use act.—In 1954 Public Law 585, The Multiple Use Act,⁴⁴ provided for multiple mineral development of public lands. The Act resolved the head-on clash which had arisen between uranium and petroleum interests by allowing each to prospect and secure rights for their respective minerals on the same lands. Representative Aspinall (D-Colo.) said that the bill in committee "was one of the finest examples of what can be done when people with different approaches to a very complex problem can sit down and present a united front to the Congress of the United States."⁴⁵

Alaskan waters.—In the Act of July 3, 1958,⁴⁶ Congress authorized leasing of oil and gas lands beneath non-tidal navigable waters in Alaska. The Secretary of Interior was directed to lease the lands pursuant to the provisions of the Mineral Leasing Act of 1920, which apply to leasing on nonsubmerged federal lands in Alaska.

Submerged Lands Act and outer continental shelf lands Act.—In 1953 Congress settled a long-standing dispute between the states and the federal government over the ownership of offshore oil deposits. The Submerged Land Act of May 22, 1953,⁴⁷ deeded ownership to the states of lands up to three miles from the shore.⁴⁸ Beyond that state limits lands were designated as "outer continental shelf," subject to federal jurisdiction and control under the Outer Continental Shelf Lands Act.⁴⁹

That Act removed these lands from the provisions of the Mineral Leasing Act of 1920, and Section 6 of the new Act established procedures for leasing of compact areas, not exceeding 5,760 acres each, by competitive bidding on the basis of a cash bonus with a royalty fixed at not less than 12½ per cent.

C. The Government in the Exercise of the national defense and foreign commerce powers Oil import controls and foreign trade agreements

With the new discoveries of the exceedingly rich oil reserves in South America, principally in Venezuela, and in the Middle East, major American oil companies were the first to offer the capital and technological know-how necessary for their development. Development has usually been accompanied through concessions granted by the foreign countries to the private companies. Under these concessions approximately 50 per cent of the oil revenues are turned over to the foreign governments, and the developing companies must find their profits in what remains. Production in these oil-rich areas has been expanded greatly in the post-World War II period and much of the foreign oil has found its way into American markets.⁵⁰

Congress has delegated to the Executive Branch the task of administering an oil import control program. At the present time the State Department, the Office of Emergency Planning, the Department of Interior, the Defense Department and, to an increasingly important degree, the Justice Department are all instrumental in arriving at a "consensus" concerning oil import policy within the Executive Branch.⁵¹

In 1949 domestic producers began appealing to the State Department for a restriction of imports. The State Department in rejecting these appeals adhered

⁴⁴ 68 Stat. 708 (1954), 30 U.S.C. § 521 (1964).

⁴⁵ *Hearings on H.R. 8892 and H.R. 8896 before the Subcommittee on Mines and Mining of the House Committee on Interior and Insular Affairs*, 83rd Cong., 2d Sess. (1954).

⁴⁶ 72 Stat. 322 (1958), 48 U.S.C. 456 (1964). Section omitted when Alaska became a state.

⁴⁷ 67 Stat. 29 (1953), 48 U.S.C. § 1301 (1964).

⁴⁸ In a recent ruling the Supreme Court granted a Justice Department request to release \$203 million of funds which had been impounded as a result of the dispute between the Federal Government and Louisiana over offshore oil rights.

The U.S. will receive about \$170 million and Louisiana \$35 million of money collected from royalties, leases and bonuses in the disputed area. *The Wall Street Journal*, Dec. 14, 1965, p. 26.

⁴⁹ 67 Stat. 462 (1953), 43 U.S.C. § 1331 (1964).

⁵⁰ PETROLEUM INDUSTRY RESEARCH FOUNDATION, UNITED STATES OIL IMPORTS: A CASE STUDY IN INTERNATIONAL TRADE (1958).

⁵¹ As a Texas Senator, President Johnson was an outspoken exponent of import limitations by quotas, but since taking office, he has said he was leaving revisions of oil import policy to Secretary of Interior Udall. *Wall Street Journal*, Dec. 13, 1965, p. 7.

to the general policy against import quotas announced in the General Agreement on Tariffs and Trade (GATT).⁵³

The Korean War temporarily alleviated the pressures of import competition. Then in July, 1954 President Eisenhower established the Cabinet Committee on Energy Supplies and Resources Policy. This Committee concluded that our national security could best be protected if imports were kept in balance with the domestic production of crude oil in the proportionate ratios which existed in 1954. The Committee recommended a program of "voluntary restrictions of imports" to be practiced by the industry itself.

During the next few years and throughout the Suez crisis⁵⁴ the voluntary program worked with less and less effectiveness, until 1959, when President Eisenhower created by proclamation the Mandatory Oil Import Control Program.⁵⁵ Under this program, which remains in effect today, imports of crude oil, unfinished oils and finished products (except residual fuel oil to be used as fuel) entering Districts I-IV (including all of the United States east of the Rockies) are not to exceed 9 per cent of the total demand in those districts. In District V (which includes the West Coast) imports are limited to an amount which, together with domestic production and supply, will approximate total demand in the district. Puerto Rico was given a quota whereby imports were not to exceed those of calendar year 1957. The Oil Import Administration, Department of Interior, is charged with the responsibility of maintaining the proper ratio of imports to demand. In 1964,⁵⁶ the ratio stood at 9.6 per cent, an increase of .6 per cent over 1959. The O.I.A. also supervises the allocation of import quotas to individual oil and petrochemical refiners.

At the present time the State Department is attempting to follow generally an open-door policy with respect to foreign trade. That Department, operating under the mandates of the Trade Expansion Act of 1962 (TEA),⁵⁷ is committed to the belief "that it is in our national interest to maximize foreign trade."⁵⁷ Nevertheless, the requirements of national security are recognized as one justifiable exception to this otherwise open-door policy.

Section 232 of the Trade Expansion Act sets out the rules governing the use of this exception and represents the legal basis for the present oil import control program. Under that section the Director of the Office of Emergency Planning is authorized to investigate and promptly advise the President of any importations threatening the national security. The President is then directed by the section to take such steps as are necessary to remove the threat. Under subsection (c)⁵⁸

⁵³ Signed at the Geneva Conference of 1947 between the U.S. and 22 other nations.

⁵⁴ During the Iranian and Suez crises major American companies producing in the Middle East were asked by the U.S. government to meet together for the purpose of ascertaining how best to overcome the effects of the crisis on supply and demand. They were guaranteed immunity from any antitrust litigation. Their voluntary agreements remain on file and will be put into effect upon the consent of the U.S. Attorney General in the event of any such future international petroleum supply crises. See *Conservation of Oil and Gas, A Legal History*, ABA SECT. M & NRL (Sullivan ed. 1958).

⁵⁵ Pres. Proc. 3279, 24 Fed. Reg. 1781 (1959), as amended by Pres. Proc. No. 3290, 24 Fed. Reg. 3527 (1959) which exempted from import restrictions crude oil imported by overland means from Canada or Mexico.

⁵⁶ Monthly Petroleum Statement, Mineral Industry Surveys, Dept. of Interior, March 8, 1965, Table 22.

⁵⁷ Act of Oct. 11, 1962, 76 Stat. 872 (1962) (codified in scattered sections of 19 U.S.C.).

⁵⁸ Letter from Douglas MacArthur II, Assistant Secretary for Congressional Relations, Dept. of State, to Gordon Allott, U.S. Senate, Aug. 9, 1965.

⁵⁹ Trade Expansion Act of 1962, *supra* note 56, § 232.

"(c) For the purposes of this section, the Director and the President shall, in the light of the requirements of national security and without excluding other relevant factors, give consideration to domestic production needed for projected national defense requirements, existing and anticipated availabilities of the human resources, products, raw materials, and other supplies and services essential to the national defense, the requirements of growth of such industries and such supplies and services including the investment, exploration, and development necessary to assure such growth, and the importation of goods in terms of their quantities, availabilities, character, and use as those affect such industries and the capacity of the United States to meet national security requirements. In the administration of this section, the Director and the President shall further recognize the close relation of the economic welfare of the nation to our national security, and shall take into consideration the impact of foreign competition on the economic welfare of individual domestic industries; and any substantial unemployment, decrease in revenues of government, loss of skills or investment, or other serious effects resulting from the displacement of any domestic products by excessive imports shall be considered, without excluding other factors, in determining whether such weakening of our internal economy may impair the nation's security."

of Section 232 the Director and President are told in broad language to "recognize the close relation of the economic welfare of the Nation to our national security." In addition, the subsection admonishes recognition of the effect of imports on "the requirements of growth of such industries [critical to defense] and such supplies and services including the investment, exploration, and development necessary to assure such growth . . ."

As recently as August, 1965 the Department of State⁵⁵ maintained that any further restriction of oil imports would not be necessary for national security and would not be in the national interest. In support of its position it notes, for instance, that Venezuela draws nearly 60 percent of its government income directly from its petroleum industry, and that petroleum constitutes about 90 percent of all Venezuelan exports. Therefore, "increasing prosperity for the Venezuelan petroleum industry is essential if the country is to remain an effective democracy and a keystone in our relations with Latin America."⁵⁶

There has been a marked increase in oil imports allowed within the last year. Imports quotas on residual fuel oil were raised at eastern ports for 1966 by Secretary Udall, despite strong objections from coal and domestic oil producers and a number of eastern railroads and utility companies.⁵⁷ Secretary Udall has indicated further that he favors the complete elimination of any import restrictions on residual fuel oil.⁵⁸ In order to accomplish unlimited imports Secretary Udall must, and apparently will, appeal to the Office of Emergency Planning for a ruling that such a move would not endanger national security. As will be seen in Part Two, United States programs regulating foreign oil imports and our national defense requirements must be taken into account in arriving at any policy for the development of oil shale.

PART 2—GOVERNMENT'S ROLE IN THE DEVELOPMENT OF OIL SHALE

Today there is no federal policy providing for the development of oil shale. Undersecretary of the Interior John A. Carver, Jr., in testifying before the Senate Interior Committee in May, 1965 said, "This reserve is so big and so valuable that . . . when one hears words like Teapot Dome . . . it tends to freeze any kind of action, either congressional or administrative."⁵⁹

And yet the formulation of an appropriate national policy is essential for the future development of oil shale. In an effort to discover why no such policy has ever been formed, this paper will first give an outline of the current situation. Next to be discussed will be the many problems which Congress must consider if, and when, it decides to establish comprehensive leasing procedures for the future commercial development of federal oil shale lands.

The problem of contested claims for unpatented lands lies outside the scope of this paper.⁶⁰ As was indicated earlier,⁶¹ the amount of land involved in these mining claim disputes is minimal compared to the oil shale lands and deposits which await the formulation of a federal leasing policy. Furthermore, the formulation of such a policy should not be precluded by the presence of these contested claims. Any policy covering the lease of federal lands would still leave resolution⁶² of remaining conflicts over contested lands to appropriate proceedings between the respective claimants.⁶³

⁵⁵ MacArthur Letter, *supra* note 57.

⁵⁶ Letter from Douglas MacArthur II, Assistant Secretary for Congressional Relations, Dept. of State, to Gordon Allott, U.S. Senate, June 22, 1965.

⁵⁷ Wall Street Journal, Dec. 23, 1965, p. 2.

⁵⁸ *Ibid.*

⁵⁹ Senate Hearings on Oil Shale, *supra* note 3, at 61.

⁶⁰ See note 5 *supra*.

⁶¹ See note 3 *supra*.

⁶² Senator Allott (R. Colo.) has introduced legislation in the past two Congresses addressed to the problem. S. 1009, 89th Cong., 1st Sess. (1965).

This bill is intended to amend the "savings" clause, Section 37, of the Mineral Leasing Act by reasserting the present validity of claims to oil shale lands which were valid but unpatented at the date of passage of the Mineral Leasing Act. The bill, if passed, would effectively revoke all administrative and legal actions taken by the Secretary of Interior in declaring these unpatented claims invalid. The bill has died in the Senate Interior Committee both times and that committee has apparently received no Department Report concerning it from the Secretary of Interior.

See also, CONG. REC. 1962 (daily ed. Feb. 4, 1965).

⁶³ Ely, *supra* note 11, at 303.

A. The Present Situation

1. Research

There is abundant material covering the economic,⁶⁸ technologic⁶⁹ and geologic⁷⁰ (principally in Colorado) aspects of oil shale.

"The Bureau of Mines has been conducting oil shale research for the past half-century. A portion of this research took place at the Anvil Points demonstration and experimental plant near Rifle, Colorado. Work is presently underway there under a lease agreement between the U.S. Government and the Colorado School of Mines Research Foundation operating in conjunction with Socony-Mobil, Humble, Shell, Sinclair, Texaco, Marathon, Continental, Standard of Ohio, Pan American, and The Oil Shale Corporation. The Union Oil Company of California and the Denver Research Institute continue to experiment with retorting methods. And finally the experimental activities of the Bureau of Mines Petroleum Research Center in Laramie, Wyoming, have recently been expanded."⁷¹

As will be seen immediately below, private enterprise now has enough information with which to begin commercial production of Shale oil. So it cannot be claimed that a lack of scientific data prevents the formulation of an oil shale policy. Technological advances will always be forthcoming, and the state of the art can always be improved, but there is enough evidence available now to make any of the determinations necessary for the formulation of a leasing policy.⁷² Those who now cry for "more research" must only be trying to stall.

2. Private industry

It is axiomatic that the economic feasibility of any capitalist venture will be best evaluated by those whose capital is at stake. The Oil Shale Corporation (familiarily known as TOSCO) was founded in 1955. "Its principal purpose was then the development of a commercially feasible, above-ground retorting system for the economical recovery of oil and other products from the oil shales of the Western United States."⁷³

At the present time TOSCO is engaged in such a joint venture with Standard Oil of Ohio and Cleveland-Cliffs Iron Ore Co., operating together under the name of Colony Development Co. In November, 1964, TOSCO had already expended or committed \$15 million, and it plans to spend in addition approximately \$30 million⁷⁴ for its participation in the project.

As part of their project the joint-venturers have built a plant costing approximately \$100 million in northern Colorado. This plant will process commercial quantities of oil from shale being mined from non-federal lands. TOSCO expects to achieve production from this plant in 1967 with initial capacity set at 50,000 barrels of crude oil per day.⁷⁵ It estimates further that costs per barrel at that rate will be between \$1.00 and \$1.30, depending upon the inclusion of hydrogenation.⁷⁶ By TOSCO's estimates, these costs make shale oil competitive with comparable crude oils presently being laid down in West Coast markets.⁷⁷

⁶⁸ HANNA, OIL SHALE, (Reprinted by Denver Research Institute, 1964).

The Oil Shale Corporation, Oil Shale Development on Federal Lands, Supplemental Written Statement to Oil Shale Advisory Board, Nov. 30, 1964 [hereinafter referred to as "TOSCO"].

⁶⁹ Prien, *Current Status of U.S. Oil Shale Technology*, (Reprinted by Denver Research Institute, 1964).

Schramm & Lankford, *Oil Shale*, DEP'T. INTERIOR, reprint from BUREAU OF MINES BULL. 630 (1965).

Thorne, Stanfield, Dinneen & Murphy, *Oil Shale Technology: A Review*, DEP'T. INTERIOR, BUREAU OF MINES IC 8216 (1964).

⁷⁰ DEP'T. OF INTERIOR, A BIBLIOGRAPHY OF BUREAU OF MINES PUBLICATION ON OIL SHALE AND SHALE OIL (1964).

⁷¹ *Senate Hearings on Oil Shale*, *supra* note 3, at 4, 8-9.

⁷² NETSCHERT, THE FUTURE SUPPLY OF OIL AND GAS (1958). In addition, see the extensive tables and statistics on trends in energy consumption and U.S. and world resources of energy in fossil and nuclear fuels collected by the Department of Interior, DEP'T. INTERIOR SYNOPSIS, *op. cit. supra* note 3, at 2-20.

⁷³ TOSCO, *op. cit. supra*, note 76, at 1.

⁷⁴ *Ibid.*

⁷⁵ *Id.* at 14.

⁷⁶ *Id.* at 7.

⁷⁷ The Department of Interior gave the following cost figures:

"One estimate recently made is that high-gravity shale oil from a 25,000 barrel-per-day plant could be delivered to Los Angeles for \$2 a barrel, and if production were quintupled, the cost would drop to \$1.76. Oil of comparable quality is now selling in Los Angeles for \$2.85 a barrel, but comparisons have to be made with prices assumed if controls [Presumably tax depletion allowances and oil import quota "input allowances" (*cf.* TOSCO, *op. cit. supra* note 68, at 15, 16 and Appendix F).] were relaxed [which has not occurred to date.]

On the other hand, the Oil Shale Advisory Board reported to the Secretary of Interior in February, 1965, its opinion that "it appears that at best oil shale would be only marginally competitive with the petroleum industry today." INTERIM REPORT OF OIL SHALE ADVISORY BOARD TO THE SECRETARY OF THE INTERIOR (Feb., 1965) (transmitted by letter of Chairman Joseph L. Fisher, Feb. 15, 1965).

Such a commercial commitment leaves little room for argument. It is made more important by the fact that the Colony Development venture plans to produce commercial quantities of shale oil from relatively poor shale deposits lying wholly within privately owned or patented lands. Thus it is crystal clear that representatives of private enterprise believe that oil can, and will, be competitively produced from oil shale. Industry demonstrates itself ready to proceed without further delay.

3. The Courts

In *Alabama v. Texas*⁷⁸ the Supreme Court dismissed suits challenging the rights of states to take lands under the Submerged Lands Act of 1953⁷⁹ on the ground that Congress had unlimited plenary power under the Constitution to dispose of the public domain in any way it saw fit. Thus the courts may be dismissed as presenting any obstacle to the establishment of a federal leasing policy.

4. The States

In 1957 the Assembly of the Interstate Oil Compact Commission, representing thirty oil-producing states, unanimously adopted a resolution calling for the opening of federal oil shale lands.⁸⁰

Further, the states of Colorado, Wyoming and Utah, through their state executives and their congressional delegations, have consistently sought development of their oil shale resources. Colorado has been particularly active in seeking early development, and in 1964 Governor Love stated: "We look to oil shale as another great industry in our State which can and will be developed in such a manner as to be compatible with the preservation of our scenic splendor and wildlife."⁸¹

Thus it seems that no state seeks to obstruct the development of oil shale.

5. The Federal executive

It was seen earlier that authority to administer regulations covering the leasing of federal oil shale lands has been delegated to the Secretary of Interior. Thus, while the Secretary could institute and administer a program for the leasing of federal lands, no secretary has ever attempted to do so.⁸² Secretary of Interior Udall has been the most elusive of all public figures on the subject of oil shale and has only said he wishes to prevent another oil scandal in this country.⁸³

Mr. James H. Smith, calls such references to old scandals "pure demagoguery" and says, "If the government is unable today to arrange contracts between itself and private enterprise dealing with public property without the risk of repeating Teapot Dome, then we do not have a competent government."⁸⁴

In 1963, apparently in partial response to such criticisms, Secretary Udall published an order cancelling the existing leasing regulations and calling for public comment as to what should go into new ones.⁸⁵ Later, the Secretary created a "blue-ribbon panel" called the Oil Shale Advisory Board and appointed Joseph L. Fisher, chairman, Orlo E. Childs, Benjamin V. Cohen, John Kenneth Galbraith, H. Byron Mock and Milo Perkins.

At the invitation of the Secretary of Interior and the Oil Shale Advisory Board, Governor Love of Colorado recommended competitive leasing of oil shale lands under the old provisions of the Mineral Leasing Act.⁸⁶ It was recommended that such leasing be done in three phases with a 5 per cent royalty at the outset. Very similar recommendations were made to the Oil Shale Advisory Board by The Oil Shale Corporation in 1964.⁸⁷ The Oil Shale Advisory Board

⁷⁸ 347 U.S. 272 (1954).

⁷⁹ 67 Stat. 29 (1953), 43 U.S.C. § 1301 (1964).

⁸⁰ Resolution No. 8, Meeting of June 12, 1957, Yellowstone National Park.

⁸¹ Statement of Governor John A. Love to the National Oil Shale Advisory Board, Dec. 1, 1964.

⁸² President John F. Kennedy viewed administration of the public domains thus: "My predecessors have been acutely aware of the dilemmas facing the Secretaries of Agriculture and Interior as principal administrators of the original public domain. Whenever they have been faced with a reasonable alternative of continued public ownership and management, or disposition, they have generally elected the former."

⁸³ HANNA, *op. cit.* *supra* note 68, at 10.

⁸⁴ The Denver Post, *supra* note 11.

⁸⁵ 28 Fed. Reg. 11796 (1963), revoking 43 C.F.R. pt. 197 (1963) (Oil Shale Leases).

⁸⁶ Letter from John A. Love, Governor of Colorado, to Stewart L. Udall, Secretary of Interior, March 27, 1964.

⁸⁷ TOSCO, *op. cit.* *supra* note 68, at 17.

issued an "interim" report⁸⁸ to the Secretary in February, 1965, but unfortunately on consensus was reached on major leasing policy questions and the report has been likened to "six dissents saying nothing." No further report from the Advisory Board has yet appeared on the horizon, and Secretary Udall now seems little disposed to take any affirmative action.

Undersecretary of Interior John Carver, Jr., has been perhaps most candid and pointed of all when he recently said:

"The Secretary has not yet determined what recommendation should be made to Congress, if any, for the resolution of any policy questions prior to the lifting of the withdrawal order

"Legally, as I have already said, I think he has the power to lift the order, promulgate regulations, and begin to issue leases

"But I also think that no Secretary, beginning with Hubert Work, right down to the present one, can take any more than tiny and tentative steps which have the effect of relinquishing title to this resource without running great risks of misinterpretation It is, in my personal and unofficial view, a question requiring congressional resolution."⁸⁹

6. Congress

Thus it is that we are led by a process of elimination to the one body of the federal government which can, and should, come to grips with the oil shale policy problem. Senator Bennett of Utah addresses himself to the problem with a statement entitled "Do Something."⁹⁰ A response to Senator Bennett is that it is now up to Congress "to do the doing" and to reassume here a portion of the initiative which some feel it has lost by default to the Executive Branch of our Government.

In May, 1965 the first "informational" hearings on oil shale were held by the Senate Interior Committee.⁹¹ Senator Jackson, Chairman of the Committee, opened the hearing with these words:

"All too often in dealing with problems affecting our natural resources, both economic and aesthetic, this committee is faced with a condition, not a theory. Conditions often demand ad hoc solutions to immediate limited problems. But . . . such is not the case here today. We hope to have basic facts and issues presented, and then to be able to deliberate upon broad overall policy questions involved in the wisest and best course of action to take with respect to this great natural resource"⁹²

In addition to committee action and congressional hearings, it may be that the oil shale policy problem will be taken up by the recently established Public Land Law Review Commission.⁹³ The Commission, which is to make its report by June 30, 1968, is not explicitly directed to study oil shale, but such a study is clearly not outside the Commission's present authority.⁹⁴

B. Formulation of a Leasing Policy: Immediate Considerations

If Congress is to formulate a leasing policy for the early development of oil shale, it must deal with a number of specific, immediate considerations. Many of them have already been outlined by members of the Oil Shale Advisory Board.⁹⁵ None present insurmountable problems. Straightforward alternatives are available from which Congress can make its necessary policy choices with relative ease.

1. Conservation

Two distinct conservation problems present themselves when considering oil shale development. First, there is concern for other regional resources in the oil shale area. Second is the concern for maximum utilization of the oil shale resource itself.

As was noted earlier, the State of Colorado is actively aware of the need to protect all of its many resources. Thus Governor Love has said:

⁸⁸ INTERIM REPORT OF THE OIL SHALE ADVISORY BOARD, *op. cit.*, *supra* note 77.

⁸⁹ *Senate Hearings on Oil Shale*, *supra*, note 3, at 38-39.

⁹⁰ *Senate Hearings on Oil Shale*, *supra* note 3, at 6.

⁹¹ *Senate Hearings on Oil Shale*, *supra* note 3.

⁹² *Id.* at 2.

⁹³ 78 Stat. 982 (1964), 43 U.S.C. § 1391 (1965).

⁹⁴ S. REP. NO. 1444, 88th Cong., 2d Sess. 13 (1964).

⁹⁵ Mock, *supra* note 12, at 59-60. See there "Issues to be considered by the Oil Shale Advisory Board."

"Conservation problems, including the disposal of spent shale, and the prevention of possible atmospheric and water pollution are under active study by agencies in our State, as are community problems relating to schools, highways, etc. We see no insoluble problems."⁹⁶

The Oil Shale Corporation has also recognized the need for industry to assume its share of the conservation burden and to insure adequate protection of air, water, surface lands, wildlife, etc.⁹⁷

In addition, TOSCO recommended to the Secretary of Interior far-thinking measures to insure proper utilization of the oil shale itself. Among these was a plan for allowing lower royalties as an incentive for the extraction of marginal and low-grade shales.⁹⁸

One problem to be considered is the disposal of the vast amounts of waste shale left over from the retorting process. This problem sounds less imposing when one hears from the Bureau of Mines that vegetation will begin to grow on the spent shale deposits after about three years of weathering.⁹⁹

Nevertheless, there are some who wish to prevent completely any commercial activity on the public domain. These so-called "protectionists" thus oppose the development of oil shale at any time or for any reason. But if the real problems of conservation are met and solved in a forthright manner and if Congress finds that oil shale development is in the national interest, then any continued objections by these protectionists will not be justified.

2. Water

It has long been recognized that water will be crucial in the commercial development of oil shale, and recently major oil companies have been buying up water rights adjacent to oil shale.¹⁰⁰

The future of the waters of Colorado, Wyoming and Utah is inextricably tied up with the Colorado River Storage Project Act¹⁰¹ and with current legislation and interstate agreements affecting the allocation of waters in the Upper and Lower Colorado River Basins. It is clearly to the advantage of Colorado, Wyoming and Utah to appropriate their unused shares in Upper Colorado River waters as soon as possible.¹⁰² Utilization in the oil shale industry is ideally suited for such appropriation.¹⁰³

3. Acreage limitations.

The question of acreage limitations is one of the most vexing problems confronted when one tries to prescribe fair leasing terms. Irregularity in grade and in thickness of the shale beds makes the amount of oil recoverable from under different surface acreage vary greatly. For instance, a 5,120-acre plot (the maximum allowed under the existing Mineral Leasing Act) in the richest parts of the shale formation would contain 18 billion barrels, an amount equal to nearly 60 percent of the Nation's proved reserves of petroleum.¹⁰⁴

Leasing by competitive bid is one answer to this problem. The Government could specify a fixed dollar amount to be paid by the bidders and each bidder would then calculate the least number of acres he would be willing to receive for that cost. The winner would be the company bidding the lowest number of acres. Undersecretary of Interior Carver said, "I see no reason why a competitive situation could not be cranked adequately into a leasing system."¹⁰⁵

Congress will not be without helpful precedents in its search for fair leasing procedures. In Part One of this paper other recent developments in domestic

⁹⁶ Statement of Governor John A. Love to the National Oil Shale Advisory Board, Dec. 1, 1964.

⁹⁷ TOSCO, *op. cit. supra* note 68, at 17.

⁹⁸ *Id.* at 20.

⁹⁹ HANNA, *op. cit. supra* note 68, at 6.

¹⁰⁰ See the recent excellent article: Delaney, *Water for Oil Shale Development*, 43 DENVER L.J. 75 (1966).

¹⁰¹ 70 Stat. 105 (1956), 43 U.S.C. § 620 (1964).

¹⁰² Legislation for the establishment of a national wild rivers system was proposed in the last session of Congress. S. 1446, 89th Cong., 1st Sess. (1965). One of the crucial implications of the bill is that future water appropriations may be foreclosed on any river to be included within the wild river system. The Green River of Wyoming is scheduled for possible inclusion in the system. This fact could foreseeably do great damage to the future development of oil shale in Wyoming.

¹⁰³ In November, 1965, the Interior Department agreed to sell to Colony Development Co. up to 7,200 acre-feet of water annually at a sliding charge from \$8.50 to \$10.40 an acre foot. The contract will run for a term of 40 years. Wyoming State Tribune, Dec. 2, 1965, p. 3.

¹⁰⁴ *Senate Hearings on Oil Shale*, *supra* note 3, at 35.

¹⁰⁵ *Id.* at 62.

petroleum leasing policy were traced. Of particular note is the Outer Continental Shelf Lands Act,¹⁰⁶ which created procedures outside of the Mineral Leasing Act for competitive leasing of off-shore oil reserves.

Further, it may now behoove the United States to look to Canada as a source for leasing precedents. Historically, Canada has given greater emphasis to hard-rock mining laws in deriving leasing principles for the development of its petroleum resources.¹⁰⁷ The United States might well follow that example with respect to its oil shale. In 1963, for instance, production was begun in the Athabasca Tar Sands. Dominion control of Canadian oil lands had been relinquished to the provinces in 1930;¹⁰⁸ therefore, it is Alberta that has been responsible for the formulation of a policy for the development of its tar sands. In 1963 Alberta issued the first production permit for 31,500 barrels per day to Great Canadian Oil and Sand Ltd.¹⁰⁹ The Alberta government in a statement of policy dated October 19, 1962, affirms that production from the oil sands will be authorized at levels so as not to interfere unduly with present or foreseeable markets for conventionally produced Alberta crude oil.

4. Revenues

Along with acreage limitations, the question of revenues is basic to any leasing policy. Further, it is a question which only Congress is authorized to settle. Separate aspects of this basic problem include royalties, taxation and depletion allowances, and the distribution of government income.

Under the existing Mineral Leasing Act, 37.5 per cent of the revenue from oil shale leases would be allocated to the state in which the lands are located, 52.5 percent would go to the Reclamation Fund, and 10 percent would go general receipts.¹¹⁰ In formulating an oil shale policy, Congress may change this distribution as it sees fit.

Congress also must make an equitable determination with respect to royalties. TOSCO and Governor Love of Colorado have recommended a royalty of 5 percent.¹¹¹ As was seen, the Outer Continental Shelf Lands Act prescribes a minimum royalty of 12½ percent for offshore leases.¹¹²

The issue of depletion allowances on oil revenues is one of foremost importance to the developing oil shale industry. At the present time the Internal Revenue Service has ruled¹¹³ that an allowance of 15 percent, as specified by statute,¹¹⁴ will be given on shales after mining. Representative Aspinall (D-Colo.) is seeking to clarify this ruling by specifying that the allowance is to come after repletting instead of after mining.¹¹⁵ In addition, crude oil producers receive a depletion allowance of 27½ per cent, and the developers of oil shale seek to have themselves included in this greater allowance category.¹¹⁶

5. New entries

It was pointed out earlier¹¹⁷ that leaders in the oil shale industry must be careful lest they run afoul of anti-trust laws prohibiting unfair competition practices which would work to the disadvantage of new entrants into the field.

Apart from anti-trust considerations, a concern has also been expressed that the high capital requirements for entry into the oil shale industry will prevent small companies from successfully competing with large, established companies. This is a problem which may exist during the development of any new industry, but it is clear that further delay by the government in opening the industry to development will only serve to entrench more firmly those major companies with private landholdings and experimental sites.

The Atomic Energy Acts of 1946¹¹⁸ and 1954¹¹⁹ dealt with this same problem by placing in the public domain certain patent rights acquired by companies who had

¹⁰⁶ Cf. note 49 *supra*.

¹⁰⁷ Thompson, *Basic Contrasts Between Petroleum Land Policies of Canada and the United States*, 36 U. COLO. L. REV. 187 (1964).

¹⁰⁸ *Id.* at 211.

¹⁰⁹ New York Times, April 8, 1963, p. 153.

¹¹⁰ THE OIL SHALE ADVISORY BOARD, *op. cit.* *supra* note 77, at 9.

¹¹¹ See p. 84 *supra*.

¹¹² See p. 75 *supra*.

¹¹³ Unpublished.

¹¹⁴ INT. REV. CODE OF 1954, § 613.

¹¹⁵ H.R. 10896, 88th Cong., 2d Sess. (1964).

¹¹⁶ TOSCO, *op. cit.* *supra* note 68, at 30-32.

¹¹⁷ See p. 67 *supra*.

¹¹⁸ 60 Stat. 755 (1946), 42 U.S.C. 2062 (1964).

¹¹⁹ 60 Stat. 919 (1954), as amended, 42 U.S.C. §§ 2011-2281 (1964).

established themselves in the industry during its early, governmentally controlled stages. The 1954 Act also requires licensees to make a full disclosure of any unpatented technology possessed by them at the time their license is granted. Congress might use similar procedures in order to insure fair treatment for all participants in oil shale development.

6. Speculation

The Department of Interior has often expressed its fear that "speculative tendencies"¹²⁰ brood menacingly over prospective oil shale development. But it should be pointed out that the "do-nothing" attitude of that Department has probably contributed more than any other single factor to speculation in oil shale land and adjacent water rights.

Bryon Mock, a member of the Oil Shale Advisory Board, recently said: "At least to me, the taint of Teapot Dome and its application to the oil shale reserves of the Federal Government will best be laid to rest by opening all or part of the Federal oil shale lands to competitive leasing with performance requirements written in that eliminate those who cannot or will not develop the reserve. This does not mean that all should be opened at once but in my opinion some should be. To some the withholding of the federal oil shale reserves from development may be construed to be as great a granting of favors to those who wish to restrict competition in that field as would be the direct issuance of preference to such people. This dilemma is one common to public administrators. To my mind affirmative action is the only solution."¹²¹

C. "The National Interest": Its broad considerations

In the preceding section immediate and specific considerations for leasing policy formation were discussed. As was noted, choices are available in each of these areas, and such choices can be readily tested, adopted and changed, if necessary, during the forthcoming development of an oil shale industry.

The present section will explore broader considerations having to do with the general "national interest." Such issues as are involved here are difficult to define and the policy choices within them are often hard to evaluate.

The writer feels that some of these issues must underlie the otherwise unexplained opposition which has so far prevented the development of oil shale. The future of oil shale depends in large measure upon the frank and open discussion of these issues. Once it can be shown that production of shale oil is in the best national interest, then the major obstacle to oil shale development will have been removed.

1. Defense needs and national security

Captain K. C. Lovell, Director of Naval Petroleum and Oil Shale Reserves, Department of Defense, says unequivocally¹²² that the immediate development of oil shale is necessary for national security. Citing figures showing projected increases in domestic demand and increased reliance on foreign oil (an estimated 30 per cent from foreign sources by 1983), he urges that development be commenced just as soon as possible. It is clear that the new oil shale industry cannot produce instant oil." Humble Oil Company estimates a lead time of from eight to ten years before facilities could accomplish "on stream" production.¹²³ Thus, Captain Lovell urges that to wait for war or a national emergency would be to wait too long before attempting to mobilize necessary shale oil production.

2. Foreign trade and the control of imports

As we noted in Part One, the State Department is committed to the expansion of foreign trade whenever such expansion would not endanger the national security. It was seen that Secretary of Interior Udall has recently indicated his desire to increase the importation of foreign oil into this country.

It is obvious that such importation of foreign oil has a profound effect upon our domestic petroleum industry. It may well be that those who oppose the development of oil shale really do so because they favor an increase in the importation of foreign oil.

¹²⁰ DEP'T. INTERIOR SYNOPSIS, *op. cit.* *supra* note 3, at 41.

¹²¹ Mock, *supra* note 12, at 67.

¹²² Senate Hearings on Oil Shale, *supra* note 3, at 64.

¹²³ Reistle, *supra* note 1.

But the strongest answer to those favoring increased imports is that such a policy would only serve to worsen the present balance-of-payments problem. Further, recent months have witnessed a series of unsettling events in foreign oil-producing countries. The government of Indonesia has recently taken over that country's major oil-production and refining facilities, which had, until that time, been owned and operated by American companies.¹²⁴ The government of Venezuela has recently levied increased taxes on American companies producing oil there.¹²⁵ These companies are being rudely reminded that "the power to tax is the power to destroy." In Libya, American companies have just undergone a difficult year. The Libyan government revised its concession agreements with American companies and now requires a significant increase in royalty payments.¹²⁶ All of these events show a trend which indicates the dangers to the United States inherent in its heavy reliance upon foreign oil.

3. Control of the "energy mix"

Congress must consider future energy requirements and the "energy mix" which would best meet these requirements. But in planning for the future, Congress must scrupulously avoid preferential treatment that constitutes a manipulation of energy sources in disregard of the demands of the open market. To do otherwise would be to engage in "end-use" control.

Oil shale should be allowed to take its place, along with other fuel sources, in providing for the Nation's future needs. Atomic energy and coal¹²⁷ are two other potentially competitive sources of fuel. In the past the government has given a great boost, through subsidies, to the atomic energy industry. Some with a vested interest in securing a favored position for nuclear power¹²⁸ may be opposed to the development of oil shale. But the oil shale industry should not now be prohibited from competing on equal terms with this and other energy sources if a genuine need for the production of shale oil can be shown.

4. Control of the market

As was noted in Part One, Rostow, de Chazeau, Kahn, and others are strongly critical of the petroleum industry and its apparent enjoyment of freedom from government regulation. They denounce in particular production control by state prorationing statutes and what appears to be industry control over market prices. Domestic exploration activity and domestic crude oil reserves are at their lowest points since 1949.¹²⁹ Now the critics of the petroleum industry may find it convenient to oppose the development of oil shale because they fear that such development would allow for a revival of the domestic petroleum industry.

But such fears are irrational and unfair. In the first place, the oil shale industry should obviously be allowed to develop on its own merits. In the second place, there are indications that it will be the mining and chemical industries, and not petroleum, which will be most instrumental in the development of oil shale. Private enterprise as a whole will contribute new technology, new capital and new market demands for the production of shale oil. Nothing prevents the government from creating new answers and establishing a workable relationship with private enterprise in this new endeavor.

In regard to all these considerations involving the national interest, Byron Mock most recently said:

"By the time the report [of the Oil Shale Advisory Board] came out it seemed to me that we had resolved two questions. First, there was no public interest that justified holding up an oil shale industry. As a consequence thereof there was no public interest that necessitated indefinite delay of lifting the withdrawal of federal oil shale lands. The second conclusion was that there were definable public benefits to be achieved from opening the oil shale reserves."¹³⁰

¹²⁴ Wall Street Journal, Dec. 31, 1965, p. 6.

¹²⁵ Wall Street Journal, Jan. 6, 1966, p. 14.

¹²⁶ Wall Street Journal, Jan. 6, 1966, p. 14, Jan. 5, 1966, p. 9, Dec. 29, 1965, p. 18. See

also, "Midwest Oil: Big Supply, Little Savvy," Wall Street Journal, Dec. 6, 1965, p. 10.

¹²⁷ Some oil companies are presently purchasing coal properties and developing techniques for making gasoline from coal. See Wall Street Journal, Oct. 20, 1965, p. 1.

¹²⁸ For instance, the TVA (which has evolved into a government power monopoly) has announced that it may build a nuclear power unit next year "if the price is right." See

Wall Street Journal, Dec. 20, 1965, p. 4.

¹²⁹ Wall Street Journal, Jan. 6, 1966.

¹³⁰ Mock, *supra* note 12, p. 65.

CONCLUSION

The requisites for the development of oil shale are clearly present. Capital, technology and manpower await the "go-ahead." Only the formulation of a national oil shale policy is lacking, and now Congress should provide for that lack.

Today the federal government holds a "monopoly" in leasable oil shale lands. The legislation of leasing procedures for these lands will, in effect, be a description of the terms by which this monopoly will be exercised. The federal government in its capacity as oil shale landlord has the present potentiality for becoming "Big Government" in the ugliest sense of the word.

But this need not be the case. Congress, with the cooperation of the Department of the Interior and interested representatives of private enterprise, has the authority and the ability to balance carefully the best interests of all parties to the present oil shale controversy. If the balancing is properly done, a policy will be forthcoming which is "national" rather than "federal" in character to the extent that it best provides for the "national interest."

The basic question which confronts those who would attempt to formulate a national policy for the development of oil shale should not be whether the federal government should reserve oil shale lands for public, as opposed to private, development. The capital expenditure for research and commercial production by the Colony Development Co. is evidence that private enterprise is already committed to the economic feasibility of private development. Further, in the light of the traditional technological superiority of private industry in this country, future shale oil production will best be done by our private mining, chemical and petroleum industries. To argue otherwise would be to make a basic departure from the principles of capitalism.

The first basic policy question which must be answered is, "When and under what terms for the distribution of revenues (*i.e.*, income taxes, rents, royalties, bonuses, etc.) will private industry be allowed to compete for the leasing of publicly owned oil shale lands?" Boiled down, the question becomes one of timing and of dollars. Ultimately, it is the market place which will best determine the adequacy of the answers given to this first policy question. For if the revenue terms are set so as to prohibit the competition of shale oils in the market place, or if leasing is not allowed at a time when there is a market demand for the product, then the value of this resource will have been lost and the national interest defeated.

The second basic policy question concerns government control. Assuming that the first policy question has been answered by the implementation of competitive leasing procedures and fair revenue distribution terms, then the remaining policy question asks, "Under what forms and degrees of government control will the production of oil shale be allowed?" Here the national interest is not so susceptible to testing in the market place. For here government controls will affect such areas as conservation, national security, social well-being and world peace—areas where an economic evaluation is often impossible. The success or failure of the national policy touching these areas will only ultimately be tested by historical judgment.

The days of the free-miner tradition have passed. In 1935,¹³¹ the last of the public domain in the United States was closed to entry prior to classification under the homestead laws. Thus was marked the passing of the American Frontier, an institution which had been celebrated by Frederick Jackson Turner and his disciples as the "world's greatest instrument of democracy." To others, its passing was a sign that "America had come of age."¹³²

The formulation and carrying forward of a national oil shale policy could well evoke like reactions in the days ahead. To some, it may spell the end of "freedom" within the oil industry. Others may recognize it as a new industry's "coming of age." But no matter what the reaction to that policy may be, its determination is best left to the legislative forum. While it can be said that a political and economic climate favorable to the development of oil shale has been lacking in the past, it is hoped that such a climate is now improving. No one of the numerous administrative problems confronting the development of

¹³¹ By Executive Orders of Franklin Roosevelt, Nov. 26, 1934, and Feb. 5, 1935, based upon authority for such withdrawal found in the Act of June 25, 1910, established a National Conservation Program (36 Stat. 961 (1910)). Coupled with the above mentioned Executive Orders was the Taylor Grazing Act of 1934 (48 Stat. 1269 as amended (1934)), 43 U.S.C. § 315 (1964)).

¹³² ROBBINS, OUR LANDED HERITAGE 423 (1962).

oil shale are insoluble. There are none for which early answers cannot be given. Apparently all that has been lacking is sufficient impetus within the federal government to move from dead center in seeking these answers. It is only suggested now that the Congress get to the task at hand. Otherwise the twenty-first century and the discovery of new energy sources will be upon us and this vast national asset will have been left wasting in the ground where it is of benefit to no man.

[*Ed. note.* The basic research for Mr. Dominick's article was due in 1966. The author informs that since that time some significant developments have occurred with respect to a national oil shale policy. These developments are:

[1. Further increases in oil importation allowances were made by Secretary of the Interior Udall in September, 1966.

[2. Foreign governments in recent months have increased their demands upon American producing companies for higher royalty, tax and concession payments on foreign produced oil. In November, 1966, Mid-East governments threatened complete confiscation of United States oil facilities.

[3. There has been increased interest in the feasibility of in-situ retorting of shale oil by underground nuclear explosion. This interest is being carried forward by the Bureau of Mines (see Oil and Gas Journal, August 15, 1966, p. 44), the Division of Peaceful Nuclear Explosives of the Atomic Energy Commission and a joint venture of some fifteen private companies. In 1966, the 89th Congress appropriated about \$1.5 million for a similar AEC project in New Mexico called "Gasbuggy." There is now expectation for nuclear testing in oil shale lands in the near future.

[4. Two potentially valuable minerals were recently discovered in conjunction with oil shale deposits. Nacholite, a sodium carbonate, and Dawsonite, a potential ore of aluminum, are now being investigated for marketability by private companies. This effort has been somewhat hampered by the fact that the Department of Interior has so far refused to specify whether Dawsonite is leasable under the Mineral Leasing Act of 1920, or locatable under the Mining Act of 1872, and if locatable, whether by placer or by lode claim. Private industry awaits that determination. In the meantime, these discoveries point up the necessity for a comprehensive national oil shale policy which would put to most advantageous use all of the related minerals of the western oil shale lands.]

Senator HANSEN. If I may, Mr. Secretary, I would like to refer to testimony on page 5 of your prepared statement. You say:

Aided by these comments we have in process the further intensive study of oil shale policy which is so necessary in arriving at the decisions on a proper program. Our target date for completion of this study is mid-January 1968.

Could I ask what this study entails?

Mr. UDALL. Well, it entails really, Senator, at this point, a review of all the comments that had been received. It entails any and all second thoughts that my own people have had about what we did in May. It entails this hearing. It entails the other comments and suggestions we received.

In other words, we are going to need some time to evaluate and digest all this mass of material.

Senator HANSEN. It would be your purpose, as you proceed with this study, to firm up your feeling on regulations and perhaps to consider their publication in the Federal Register, say, within a year or two; is that correct?

Mr. Udall. Our objective is to move as rapidly as we can, and I have indicated this January date because we have this fixed in our own mind. I want you to know that.

Senator HANSEN. Thank you.

Mr. Secretary, a number of companies have pending before you at the present time applications for sodium preference right leases. It is my understanding that these companies have made detailed technical

presentations to you describing their intentions with respect to developing these so-called saline sections that contain among other things nahcolite and dawsonite minerals.

Point 1 of your five-point program published in January of this year stated, "Pending sodium preference light lease application will be promptly considered on their merits."

I would like to ask what is being done by your Department to reach a decision under present law on these lease applications.

Mr. UDALL. Senator, I can only give you a general answer on this because I have not had a conference on this leasing in weeks. I am aware of these leases. We were serious in what we said earlier, that we were not putting these on the shelf. We did intend to process them and work on them, and perhaps I can give you a more detailed report on it soon.

Senator HANSON. Thank you, Mr. Secretary. I would observe that some of these applications, I think, have been filed with your department for more than 15 months, and I share your hope that there can be an early resolution of them. I think that the industry would certainly welcome the clearing up of the problem that is before you.

I would like to ask, Mr. Secretary, does the Anvil Points contract include the right to do research on other minerals such as the sodium minerals and, if so, what information has the government received from the Anvil Points group concerning the sodium deposits and their potential?

Mr. UDALL. Senator, I would like to give you a reply, a quick reply, in writing on this. My impression is, and I was personally involved in the Anvil Points, that the main thrust of the research there is in the direction of perfecting a process for the extraction of shale oil. There may be some of the research in terms of the mineral values, but I think the main thrust is process, improving the process.

Senator HANSON. On the oil shale?

Mr. UDALL. That is right.

(The information requested is as follows.)

Nothing in the Anvil Points lease agreement precludes research on minerals at the Anvil Points facility. However, there is so little dawsonite and nahcolite in the oil shale there that such research probably would not, and to the best of our knowledge, has not been conducted. No data on minerals research at Anvil Points have been made available to us by the Foundation or the six companies.

Senator HANSEN. I note that the thrust of these hearings is to get the reaction from the private sector, and that, of course, tied into the whole thing, I think, is the thought that has already been expressed: businesses and corporations, whether they be oil companies or whatever, are in a competitive situation today. They no longer feel constrained—or at least this is my observation—to stick with one particular activity, and I would just like to observe that whether we do get a viable oil industry going or not, I think, will depend upon the framework of the regulations that are propounded—it resolves itself, in my judgment, down to a simple matter of economics, if a company can invest *X* millions of dollars in some other ventures, it may very well do that instead of trying to continue with the offering of oil to the consuming public in this country, and in that context I think that all of us ought to keep in mind that the industry, the banks and everyone

else, will be studying closely, very simply and purely, what the opportunities for profits are in this operation as compared with other things.

I have no further questions. I would like to compliment you, Mr. Secretary, for your leadership and it does not go unnoticed that this is the first time in more than 30 years that someone has had the courage and has recognized the vital interest that this Government has in looking toward its own resources. I think, as you have already emphasized, that the conflict in the Middle East shook all of us out of our lethargy and gave added impetus to see what could be done in order to shore up our own energy supplies right here in this country.

I compliment you for a very excellent statement.

The CHAIRMAN. Thank you, Senator Hansen.

Mr. Secretary, on behalf of the committee, we wish to express our appreciation for your appearance here this morning. We will undoubtedly be calling on you again before we get through with these hearing. Thank you very much.

(The statement of the Rocky Mountain Oil & Gas Association follows:)

ROCKY MOUNTAIN OIL AND GAS ASSOCIATION,
September 14, 1967.

SENATE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

GENTLEMEN: The Rocky Mountain Oil and Gas Association would like to submit for inclusion in the record of the hearing commencing September 14, 1967, its views with respect to oil shale, and in particular the proposed leasing regulations published by Secretary Udall on May 10, 1967.

Our Association has a membership of 470 individual and company oil and gas operators of all sizes, ranging from small independents to major oil companies. Its region of industry representation includes the states of Colorado, Wyoming and Utah, in which oil shale is found, as well as the states of Montana, South Dakota, Nebraska and Idaho.

We are pleased that the Secretary of the Interior has recommended that private industry develop the oil shale resources located on Federal lands. We believe that this decision is in the best interests of the nation, because through competitive free enterprise our natural resources have been and are now being effectively developed at low cost to the consumer.

A key reason that the American consumer enjoys the cheapest energy in the world's history is that the United States Government policies have in general been quite stable, substantially assisting long range planning. The uncertainties and restrictions contained in the proposed regulations as discussed below may well defeat the development of this great oil shale resource by private enterprise.

1. We respectfully submit that we can see no persuasive reason why research effort should be restricted to a few applicants selected by the Secretary. Government owned acreage should be made available to all qualified applicants for the sole purpose of research. The acreage could be made available for research on a basis similar to a license or prospecting permit.

2. When a lease is granted under the regulations as presently proposed, the Lessee does not know if the lease will be extended for commercial production. Furthermore, if the lease is to be subsequently extended to commercial production he does not know the extent of acreage or reserves to be covered by the extended term lease. In effect, the Department of Interior proposes to require any oil shale lessee to expend very large sums of money on research without any assurance that he will have a production lease and no knowledge of what the production lease would cover if granted. This approach is entirely without precedent and will constitute a definite deterrent to research and production. Companies will be reluctant to make the sizeable investment in research without knowing in advance both the term of the lease and the acreage covered by the lease.

3. The royalty provisions of the proposed regulations would operate to discourage investment and thereby deter competition and development. The graduated royalty schedule based on net income, in addition to income taxes, would make it most difficult, if not impossible, to compete with other sources of energy.

It would be difficult to administer and it would also operate to penalize the more efficient operators. We recommend that the lease provide for a fixed royalty rate not to exceed 5% of the gross value of the product from the retort or at the in situ wellhead.

4. The proposed regulations will operate to curtail research by not allowing a research lessee to retain the benefits of his research discoveries and thereby have an opportunity to recover his large investment. Because of this, many companies or individuals may wait for someone else to do the research and use the results without cost in a commercial operation.

If our oil shale resources are to be effectively developed to meet the needs of the nation, we believe that the proposed rules should be broadened and made more flexible so as not to discourage development of this resource by restricting the entry of a broad variety of companies and other groups into the research and development of oil shale.

Our recommendations are as follows:

1. We believe that the regulations as written are unworkable as discussed above because of the complexities introduced by tying the research and commercial phases together. Nevertheless, if they are modified to eliminate some of the problems discussed above, there may be some who would desire to proceed under such a program.

2. We recommend that tracts of public lands be made available solely for research purposes, limited in size, with the provision that once the research program was completed, the premises would revert to the United States. These tracts should be made available without cost, or at a nominal charge, to any qualified party desiring to do research, with such party retaining all patents and research information as is customary in any private research project. The benefit to be derived by the United States would be encouragement of research and development of this vital natural resource.

3. There may be some companies who now would like to have the opportunity to acquire commercial oil shale leases on specific tracts and proceed with construction of facilities for production of shale oil without the necessity of doing further research as required under the rules as proposed. Leases could be put up for sale on a competitive bidding basis similar to that now used for off-shore leases. For the protection of the government and the lessee, the leases should be on a prescribed lease form. Reasonable annual rentals or other payments could be established which would be sufficiently high to provide an incentive for early development by the lessee. Such rentals would not be payable once commercial production was established. The lease term should be for five years and so long thereafter as diligent operations for the production of shale oil are being conducted. The rentals and relatively short primary term of the lease would discourage speculation and foster continuous progress toward production.

Some of the suggestions which we have made in these comments may require the enactment of legislation to clarify and supply needed authority for the Secretary. To the extent required, legislation to accomplish this purpose should be drafted and introduced in Congress. Uncertainty in the laws and regulations is one of the greatest deterrents to progress in the development of oil shale. Necessary guidelines must be set in order to attract the necessary capital.

While oil shale has enormous potential, it cannot be utilized without solution of a number of economic and technical problems which now impede its development. Great effort by both industry and government will be required to resolve these problems. Oil shale also faces severe competition from other energy sources. We believe, therefore, that if this great resource is to ever be made available to the nation, the emphasis of the government's policy must be on encouragement rather than restricted development by private enterprise.

We hope that the views of our Association will be of assistance to the Committee on Interior and Insular Affairs in its consideration of this complex subject.

Respectfully submitted,

COLLIS P. CHANDLER, JR.,

President, Rocky Mountain Oil and Gas Association.

The CHAIRMAN. The committee will stand in recess until 2 o'clock this afternoon. The first witness this afternoon will be Dr. Charles F. Jones, President of Humble Oil and Refining Company.

We hope to hear from the other four additional witnesses before we conclude this afternoon.
(Whereupon, at 12 o'clock noon, the committee recessed, to reconvene at 2 o'clock p.m. the same day.)

AFTERNOON SESSION

(Present: Senators Jackson (presiding), Moss, Allott, and Hansen.)
The CHAIRMAN. The committee will come to order.

The committee will resume its sitting. Our first witness this afternoon is Mr. Charles F. Jones, president of the Humble Oil & Refining Co. Mr. Jones, we are delighted to welcome you to the committee. I assume you have a prepared statement?

Mr. JONES. I do.

The CHAIRMAN. You may proceed.

STATEMENT OF CHARLES F. JONES, PRESIDENT, HUMBLE OIL & REFINING CO.; ACCOMPANIED BY GEORGE H. SHIPLEY, HEAD, COAL AND SHALE OIL DEPARTMENT, AND RAYMOND D. SLOAN, MANAGER, RESOURCE ACQUISITION, COAL AND SHALE OIL DEPARTMENT

Mr. JONES. Thank you.

Mr. Chairman, I am Charles F. Jones, president of Humble Oil & Refining Co. which has its headquarters in Houston, Tex.

I am accompanied today by my two associates from the company, Mr. George Shipley, on my left, who is the head of our coal and shale oil department; and Mr. Raymond D. Sloan, on my right, who is the manager of resource acquisition in that department.

Now, Humble is the principal domestic subsidiary of Standard Oil Company of New Jersey, and our company is engaged primarily in the petroleum business with operations in exploration, production, transportation, refining, and marketing.

I consider it a privilege to appear before this distinguished committee. I would like to thank the chairman and other committee members on behalf of my company for giving us this opportunity to state our views regarding the need for commercial development of shale oil and the type of federal regulations that would be conducive to development of an oil shale industry on public lands. Humble has been engaged in oil shale research for many years and we are vitally interested in these subjects.

Before offering specific comments on the regulations proposed by the Department of the Interior, I would like to discuss the Nation's future need for energy and the role which shale oil might play in meeting this need. A recent study prepared by the Bureau of Mines indicates that in 1980 the United States will consume almost 65 percent more energy than we consumed in 1965. While part of this growth will be supplied by natural gas, hydropower and nuclear energy, the Bureau of Mines anticipates that U.S. demand for petroleum will grow from a current level of about 12 million barrels daily to about 18 million in 1980.

Basically there are three ways in which the sizable growth in demand for petroleum can be met. First, by increasing indigenous pro-

duction of crude oil; second, by increasing imports; and third, by developing production of synthetic oil from shale or coal. If we assume that in 1980 the portion of U.S. petroleum requirements supplied by domestic crude oil and natural gas liquids remains unchanged, and even allowing for a decline in the reserve-production ratio to 9 years' supply, gross additions to U.S. reserves of liquid hydrocarbons would have to be about 72 billion barrels during the next 14 years. This is a major task as evidenced by the fact that during the last 14 years U.S. reserve additions totalled only 48 billion barrels.

It is difficult and perhaps impossible to predict future discoveries of crude oil with a high degree of accuracy. We have, however, made such forecasts and the results of this work suggest that during the 1970's U.S. reserve additions will not keep pace with requirements. We feel it is important that this possibility be fully recognized and that serious consideration be given now to various ways of supplementing production of conventional crude oil during that period.

The CHAIRMAN. Mr. Jones, I just wanted to observe, I thought you were ad-libbing for a while, but page 1 of your statement is not available to us. The statements we have start at page 2.

Mr. JONES. We gave you a special copy to cut part of it out, I take it. (Laughter.)

The CHAIRMAN. We considered your position.

Mr. JONES. My sincere apologies. I believe, Mr. Chairman, you will find that what I say was consistent with what now appears on page 1.

The CHAIRMAN. It was very factual. It sounded very fine, but I was wondering for a moment whether you were just ad-libbing or whether there were some real meaning in why you started at page 2. I do not know whether you are superstitious, but that is all right.

Mr. JONES. I wish I could claim there was a real intent in this, but it is purely accidental on our part. [Laughter.]

If we are together now on page 2—

The CHAIRMAN. All right.

Mr. JONES. The growth of non-conventional sources of liquid energy depends, in part, on the emergence of a gap between U.S. demand and supply of conventional domestic production plus imports. Such a development would create an opportunity for shale oil; however if shale is to fill part of a possible gap, appropriate steps should be taken now to permit the development of this industry. We cannot overlook the fact that it will take a number of years to perfect the technology essential for a competitive shale oil industry.

Oil shale is in abundant supply in the United States and could become a major source of energy. But we must put to rest the mistaken fears that it will obtain a disproportionate share of the energy market. Certainly, shale oil cannot inundate the market overnight. It will likely have a modest beginning and will only supplement and not replace domestic crude oil.

Also, contrary to many public statements, the production of oil from shale will be costly. Although the per barrel investment in a commercial mining and retorting operation is lower than that for liquid petroleum, operating costs are considerably higher than for operating average oil producing properties. Our current engineering studies show that, with appropriate royalty and tax provisions, shale

oil produced in commercial operations involving mining, crushing, and processing would have about the same book rate of return as the national average for mining and manufacturing generally. Under the proposed Department of the Interior regulations, however, returns would be substantially lower. Thus, there is nothing in our studies that suggest windfall profits.

Some facts regarding shale oil reserves in this country are worthy reviewing. The most important oil shale deposits in the United States occur in the Green River formation of Colorado, Utah, and Wyoming. The frequently-quoted estimate of 2 trillion barrels of shale oil grossly overstates the economic reserves available. This figure includes all shale oil in the deposits and, as with crude oil, a large portion of the deposits will not be recoverable. There is a vast difference between a resource in place and the amount that is recoverable with existing technology and the usual economic limitations. With known technology, recoverable shale oil amounts to a relatively small fraction of the total oil in place.

There are wide differences of opinion on how much oil can be recovered from these oil shale deposits. The differences can be attributed in large part to the parameters used in making the estimates. For example, Dr. Russell G. Wayland, of the U.S. Geological Survey, recently testified before the Senate Antitrust and Monopoly Subcommittee that from the high-grade shale, which is a 30-35-gallon-per-ton shale, "about 80 billion barrels of shale oil is considered recoverable by demonstrated mining and retorting methods." Humble estimates that from a 25-gallon-per-ton and richer shale, about 160 billion barrels of oil could be recovered. Neither Dr. Wayland nor Humble says these amounts can be recovered economically. On either basis the oil potential is tremendous, even if it is only a small fraction of the trillions that have been quoted by various sources.

Regardless of the amount of recoverable reserves that is eventually established, about 80 percent or more is on the public domain. Some 11 million acres in Utah, Wyoming, and Colorado are underlain by the Green River formation and are classified as oil shale lands. Most deposits on these lands, however, do not contain sufficient recoverable shale oil to be commercially attractive. The richest shales are believed to be in the Piceance Basin of Colorado where some 770,000 acres contain 25-gallon-per-ton and richer shale in thicknesses of 15 feet or more. This acreage represents only a small part of the total acreage classified as oil shale lands, but it contains the bulk of the recoverable reserves with foreseeable economic potential.

The Federal Government controls about 580,000 acres of potentially productive lands in the Piceance Basin of Colorado. This acreage should be made available for leasing under the Mineral Leasing Act. Title to most of this land, however, is clouded with numerous types of unpatented mining claims and sodium exploration permits. Clear title is essential to the development of these federally owned shale lands. The validity of each title is subject to adjudication under existing laws and is properly the concern of our courts. The Department of the Interior should take immediate steps to expedite the final resolution of this all-important legal problem.

I would now like to comment on oil shale technology. Oil shale is a marlstone containing a solid hydrocarbon known as kerogen. Raw

shale oil is derived from kerogen by heating the rock to a high temperature, a process known as retorting. The two major approaches for extracting oil from shale are (a) retorting of mined shale and (b) *in situ*, or underground, retorting.

First as to retorting of mined shale, the potentially commercial oil shale contains inert rock in the range of 80 to 85 percent by weight. This means a relatively large volume of rock must be mined, crushed, passed through a retort vessel, and heated to temperatures sufficient to break down the kerogen and produce raw shale oil.

With regard to *in situ* retorting, we have here a process whereby the oil shale would be heated underground to break down the kerogen. The hydrocarbon vapors generated in the form of raw shale oil at the surface. This process would eliminate the mining, crushing, and disposal of large volumes of rock. To date, however, the possible application of the *in situ* process is based mostly on theory, and little has been proved regarding practicability. There has been much talk in government and industry about utilizing a nuclear blast to create a large underground zone of broken rock. This rock would then be heated in place, and the shale oil recovered at the surface. The nuclear concept is dramatic, but we believe the possibility for development of a practical system is remote.

Even though the *in situ* process provides desirable objectives and will continue to attract research attention, we believe that the mining and retorting approach offers the best promise for the development of a shale oil industry in this country.

After retorting, the complex process of upgrading still remains. The raw shale oil is not a suitable refinery feed-stock; it must be converted to a synthetic crude oil by adding hydrogen and by removing the undersirable elements of nitrogen, sulfur, and oxygen. The upgrading operation requires elaborate high-pressure and high-temperature equipment.

Now, turning to the role of private industry in this effort, many companies have made significant commitments of capital and technical resources for the development of an oil shale industry. One example is the retorting research operations financed and conducted by several companies, including my own, at the Bureau of Mines experimental facilities in Anvil Points in Colorado.

Humble has been engaged in land acquisition and research program for several years. We have spent more than \$15 million on oil shale since 1963. I would hazard a guess that in recent years private industry has spent over \$100 million in similar efforts. But even more important, private industry has demonstrated that it is capable of and willing to finance and conduct the necessary research and development to bring shale oil into commercial production.

The Senate Antitrust and Monopoly Subcommittee recently concerned itself with questions of monopoly and antitrust in connection with development of the federally owned oil shale deposits. Although this concern is understandable, the Mineral Leasing Act of 1920 contains provisions which insure against the possibility of a monopoly. The act provides that no lease can exceed 5,120 acres and that no person, association, or corporation can hold more than one lease. Considering the large amount of public land involved, it is difficult to

imagine any possibility of monopoly in developing oil shale deposits, particularly when the Federal Government itself controls the issuance of leases.

I would like to add that the petroleum industry operates daily in an extremely competitive environment. There are hundreds of marketing and refining companies, and in the producing phase the number of firms reaches into the thousands. These companies are competing constantly; for example, in the recent Outer Continental Shelf lease sale, about 55 companies participated in the bidding for the acreage the Government offered for sale. The nature of the competition in the industry has been recognized by Government officials. Before the Senate hearings on the competitive development of oil shale, Dr. Willard Mueller of the Federal Trade Commission stated: "that the competitive performance of the petroleum industry over the last 50 years has been quite effective."

Humble believes that in the best interest of the Nation the mineral energy resources contained within the public domain should continue to be developed by private enterprise under a minimum of Federal controls, as in the case of oil and gas, and without further Government expenditures on research. Multiple efforts by numerous private firms have developed the oil industry as we know it today. History well demonstrates that such efforts have been particularly successful in providing the necessary research and development for new processes and new products. This approach should be continued for oil shale. Thus, the Government should encourage private research and development leading to the commercialization of shale oil on the public oil shale lands.

Development of shale oil production should be determined by the normal economic forces governing competition among fuels, which have been so effective in the past. The free play of competitive pressures among domestic energy sources continues to be the best means of supplying the needs of the public at reasonable prices.

I would like to turn now to our position on the proposed regulations and with the general concepts I have just recited as a guide. I will discuss the specific regulations proposed by the Department of the Interior.

May 10 of this year, the Department of the Interior published its proposed regulations to govern oil shale leasing and land exchanges. Comments on the proposed regulations were invited. My company submitted its comments on the proposed regulations to the Department of the Interior on June 8, 1967.

We agree with Secretary Udall's testimony before this committee on February 21, 1967, that the Mineral Leasing Act of 1920 provides adequate authority to lease deposits on the public domain for the commercial development of shale oil. This act contemplates the development of mineral resources on the public domain by private enterprise. The public interest has been well served under this competitive system. We believe that extension of this concept to the oil shale lands will result in their orderly, efficient, and timely development.

The substance and general tenor of our comments on the proposed regulations follow:

The Secretary is to be commended for taking the initial step which could result in the development of federally owned oil shale reserves.

However, Humble believes that the proposed regulations do not provide adequate incentive for private enterprise to commit its technical and capital resources to the development of the reserves on the public domain. We are particularly concerned that the regulations will contain concepts that would inhibit the normal development of this natural resource.

Humble believes that leasing of the Federal shale lands should be done on a competitive bid basis, preferably by public auction, using a bonus system with a fixed, moderate royalty. The bonus system will result in the maximum leasing income to the Federal Treasury, the fostering of normal economic forces, the prevention of premature investment by industry, and the avoidance of speculation in leasing. Competitive pressures will automatically require that the lease bonuses reflect the profitability of shale oil operations; therefore, the royalty should be held to a relatively low, fixed amount so that shale oil will not be at a cost disadvantage compared with competing energy sources. Bidding for leases should be open to all potential participants on a competitive basis, with no discrimination in respect to firms in any particular industry, size category, or other classification. Unitization of lands into efficient conservation or production units should be permitted. It is not necessary that an extensive amount of acreage be leased currently. Rather, land should be made available for lease on a periodic basis, similar to the procedure used in the leasing of Federal oil lands on the Outer Continental Shelf.

The holding of leases for speculation should be discouraged by requiring the expending of appropriate sums for research and development during each year of the lease until commercial production has been achieved. Failure of the lessee to carry out diligently the agreed-upon program should be grounds, subject to court review, for forfeiture and cancellation of the lease.

I would now like to focus attention on the following specific sections of the proposed regulations, and for each I will give our views and then our position.

Section 3170.0-1 covers the purpose.

One objective contained in this section is to "encourage participation by companies not favorably situated with respect to access to reserve of the minerals present in oil shale." This objective could discourage those companies which in the past have taken the initiative to develop research and technology for the exploitation of oil shale and related minerals.

Our position here is that the regulation should encourage and foster research and development efforts by any and all qualified individuals and companies.

Section 3170.1: Designation of available lands.

This section precludes industry from having any voice regarding lands that will be designated for leasing. The location of the lands is of utmost importance from the standpoint of terrain, accessibility, availability of water and other utilities and of constructing and operating plants for research and commercial operations.

This section also limits leasing of oil shale lands to not more than 30,000 acres, presumably divided among three States, and would unduly restrict broad industry participation in oil shale development.

Our position on this section is that the regulations should not limit the Secretary as to the total amounts of land which he may designate. We think this section should provide that the Secretary designate from time to time reasonable amounts of land, with clear title, based on nominations made by qualified individuals and companies.

Sections 3171.2-3171.3 cover the form and contents of application and considerations to be used in evaluating applicants.

These sections relate to the qualifications of an individual or company for acquisition of an oil shale lease by application based on an acceptable research program and on the need by the applicant for both the acreage and the products therefrom. Those portions of these sections requiring disclosure of ownership in private lands, divulgence of confidential reserve information, and detailed projections of research and commercial operations go far beyond what is necessary to determine capability and qualifications. Information of this type is not relevant to the technical and financial capability of the applicant.

A number of provisions pertain to an applicant's need for reserves and require the applicant to set forth his nonfederally owned oil shale reserves and conventional crude oil reserves. The principle that an applicant's need for reserves should be a factor in determining whether an applicant would be granted a lease is a real cause for concern. The merits of the proposed plan of research and development and the applicant's ability to carry out that plan should be the determining factors in granting or failing to grant a lease.

Our position then is that oil shale leases on public domain land should be awarded by competitive bidding, preferably at public auction, with the requirement that the successful bidder perform a reasonable amount of research and development leading to commercial production. Open competitive bidding would withstand public scrutiny and would stimulate commercial development of public oil shale lands consistent with the needs of the Nation.

Section 3172.2 covers the term of lease.

Under this section the research term of the lease is too indefinite and extension of the commercial production term depends on the discretion of the Secretary of the Interior.

Our position here is that the lease terms proposed are not appropriate for a competitive bidding system, and thus should be modified as follows:

First, with research to research term. All leases and notices of lease sales should provide for a specific research terms. Such research term may be extended by the Secretary, provided the total term, as extended, does not exceed 10 years. The leases should be subject to termination, after appropriate court review, in the event research and development obligations are not satisfied.

Second, with regard to commercial production term. The commercial term of the lease should commence upon satisfactory completion of the work to be performed during the research term and should continue for so long thereafter as mineral products are produced from oil shale in paying quantities from deposits on the land.

Section 3172.3 covers acreage designation and limitations.

This section is too restrictive on the rights of the lessee because the Secretary would have the right to select the research site, to determine

the quantity of mineral deposits needed for commercial production, and to limit the area of commercial operations.

Our position here is that for greater efficiency the lessee should have the right to select the research site and should be permitted to hold and develop the total acreage as described in the lease.

The regulations should provide for the inclusion of additional acreage in the lease, as long as the total acreage covered by the lease does not exceed the legal limitation.

Section 3172.5 has to do with royalties.

The royalty schedule proposed in this section would stifle the development of a shale oil and associated minerals industry on public lands. Such a schedule based on a graduated percentage of net income, together with the current Federal income tax structure, would operate to discourage the investment of private capital. In addition, such a schedule would increasingly penalize an operator in proportion to increased operating efficiency. Thus, it would have the overall effect of placing the commercial production of shale oil and associated minerals at a serious competitive disadvantage with alternate sources of energy having a fixed royalty schedule.

Our position on this matter is that the royalty rate on hydrocarbon production should be a fixed amount not to exceed 5 percent on the gross value of the first products recovered from retorting. Historically this percentage has been used satisfactorily for other minerals. In case of in situ operation, the royalty rate should be the same based on the first products recovered from the wellhead. In either case, royalty should be payable only on products sold or used off the premises.

On all other minerals, the royalty should be 5 percent of the proceeds received by lessee for such minerals on the premises in their raw form after retorting and concentration but prior to any treating or beneficiation. Should lessee sell such minerals in another form on the premises or remove such minerals from the premises, the royalty should be 5 percent of the market value of such minerals on the premises in their raw form prior to any concentrating, treating, or beneficiation.

The royalty payments should be waived during the first 5 years of the research term as permitted by the Mineral Leasing Act.

Section 3172.9 covers other provisions.

Portions of this section require that disclosures of technical information be made public and that patents be assigned to the Federal Government. This section would destroy one of the most powerful competitive forces that could be brought into the oil shale development. The effect of these provisions would be to compel the lessee to disclose all of his technical "know-how" and operating data as well as background information and data accumulated from prior research efforts.

Our position here is that the lessee should be required to make available to the Federal Government only such data and information as is necessary to assure that the lessee is conducting a prudent and efficient operation. All technical information so acquired should be held confidential by the government during the research term. Patents obtained by a lessee should continue to be held and licensed by him in the same manner as other patents. Under this patent system, the United States has achieved outstanding industrial and scientific progress.

Section 3172.10 covers antitrust consultation.

This section provides that prior to issuance of a lease, the Attorney General will advise if issuance conflicts with the Federal antitrust laws.

Our position here is that this regulation is unnecessary because of the acreage limitations contained in the Mineral Leasing Act.

The proposed regulations also set out a position with regard to exchange of oil shale lands. These provide that under the Taylor Grazing Act, we point out that under the Taylor Grazing Act, oil lands to be exchanged would have similar geological characteristics. We think these limitations are too restrictive because of technical difficulties in evaluating such characteristics. Such a requirement would cause numerous administrative problems.

Our position here is that the criterion should be that the offered oil shale land be of a value approximately equal to or exceeding the value of the selected public land.

Now, in conclusion, I would like to summarize our views concerning the development of oil shale on the public domain.

1. Liquid fuels from nonconventional sources could be needed in the next 10 to 15 years, and oil shale could become a supplemental source of energy.

2. Because of leadtime requirements, steps should be taken now to encourage the necessary research and development of oil shale on the public domain.

3. Oil shale on the public domain can best be developed by private enterprise.

4. Clear title to the public domain oil shale lands is essential to such development.

5. Regulations proposed by the Department of the Interior do not provide the necessary encouragement and incentives for private enterprise to commit its technical and capital resources to the important task of developing this industry on the public domain.

6. Revised regulations should be issued by the Department of the Interior without delay. These regulations should be conducive to the diligent advancement of research and development by private enterprise so that shale oil can make its proper contribution as a supplemental energy source when the need arises.

Mr. Chairman, this concludes my prepared remarks. Thank you.

The CHAIRMAN. Thank you, Dr. Jones.

You state that Humble believes that, in the best interests of the Nation, the mineral energy resources contained within the public domain should continue to be developed by private enterprise under a minimum of Federal controls, as in the case of oil and gas, and without further Government expenditures on research.

Is it not true that if some of the smaller companies are going to have an opportunity to participate in a competitive way that the research being done by the Government could be of considerable help in giving them a better competitive position? I am not saying that the Government should subsidize other companies, but they are not all equal in their research capability. Would you cut off all Federal research in this area?

Mr. JONES. Mr. Chairman, I believe that my position on Federal research is that there are certain areas that transcend individual com-

pany interests, and that are in the national welfare, and that are not in the private sector, that are appropriately the concern of Government. This has to do with public health, for example, for the space program activities which have no immediate relation to the private sector, and a number of other areas.

But in those areas where research is being conducted to satisfy a demand of the economy, and which can be and has been appropriately handled by the private sector, I feel that there should be no Federal research.

The CHAIRMAN. To be specific, what areas are we talking about with reference to the pending matter? I do not think there is any great quarrel about the fact that the Government should not necessarily parallel what private industry is doing. But the statement is "without further Government expenditures on research," and that would mean the whole area that we are talking about, would be cut off from Federal research funds. I question whether this is desirable?

Mr. JONES. Well, obviously—

The CHAIRMAN. In the nuclear field, for example, which was referred to this morning, Dr. Teller—years ago—wanted to move the Plowshare program into this field and apply it to oil shale. This is involved, of course, in connection with the work that the Atomic Energy Commission has undertaken in trying to improve various aspects of the peaceful nuclear explosive applications. You would not cut off this research would you?

Mr. JONES. Should this work move forward with research on the use of nuclear fission in *in situ* retorting obviously the AEC would be involved in this.

So, within the confines of that area AEC has to be involved; but the research work that would be attendant to follow up on it, in my opinion, would be appropriately conducted by private industry and not by the Government.

The CHAIRMAN. There again you get into the question of degree. It would have to be decided where to cut it off.

Mr. JONES. Yes. This does involve a matter of judgment.

I am really trying to speak to the principle that I cannot support the concept of government research in competition with private research to satisfy consumer needs that are appropriately a part of the private sector of the economy.

The CHAIRMAN. Senator Allott?

Senator ALLOTT. Yes.

On this research, Dr. Jones, I take it that you feel that any effort by Government to get involved in a broad general research program comparable to that which is carried on by numerous private companies, at the present time, would be an extravagance which the Government cannot afford.

Mr. JONES. I would certainly agree with that, Senator.

Senator ALLOTT. But also you recognize that if we get into the *in situ* retorting, certainly the government is going to have to be involved in it, at least until such time as the laws of this country are changed with respect to the use and production of atomic energy.

I would like to discuss with you for a few moments the question of the royalty situation and just exactly how you feel that the royalty

provisions offered by the Secretary would affect the development of a viable industry.

As I understand it, you feel that the bracketed scale of royalties would tend to have a depressing effect upon the expansion of the industry rather than an expansive effect upon it.

Mr. JONES. I do indeed, Senator.

I suppose there are two things basically that worry me, perhaps three things that worry me, about the royalty approach. The first one is simply a philosophical one that penalizes the more efficient operators. One of your strongest driving forces of—

Senator ALLOTT. For some reason I cannot hear you.

Mr. JONES. Am I cut off?

Senator ALLOTT. I do not know. You know, we talk about sending people to the moon, but for some reason or other we cannot get a speaking system in this committee room that can be heard around the room.

The CHAIRMAN. I have always said if somebody can come up with a simple microphone that could be used effectively and reliably we ought to give him the Nobel Prize. [Laughter.]

Senator ALLOTT. I agree with that.

Mr. JONES. I guess, as an aid, this is one of the most comforting things we have. We can be pretty sure the machine won't quite replace us because every once in a while it gets out of whack.

Back to the question you raise concerning an expansion of my views on these royalty provisions. In essence, they provide that the more efficiently you conduct your operation, the more you will pay as royalty payments.

This concept of taking money away in the form of royalties as a percent of your net income is to me diametrically opposed to the strongest motivating force that we have in private industry of continuously doing our best to innovate, create, and to improve our operations, and to minimize costs.

Experience has shown that as we do this competition moves the appropriate portion of the gains so made back into the private sector in the form of improved products at reduced prices.

Now, secondly, if this is intended as a tool for the Government getting the right amount of money for these properties on public domain, as I pointed out in other parts of this testimony, I feel it is an unnecessary tool. If the competitive system is involved in bidding, the companies doing the bidding will take into account the profitability, obviously, of the entire operation, and the bids would be developed to reflect the overall profitability.

I think, if we look at the development in other areas, in the number and type of offshore bidding for the Outer Continental Shelf, we have seen how this has resulted in, over the years, intense activity by the various companies in their bids.

If we take into account the profitability from these operations, this is reflected in the bid prices for the leased lands. So graduated royalties are, at best, an additional tool which would add nothing to the basic tool that is built into the competitive bidding system. But I think the worst thing about it is that it dulls initiative, and essentially it penalizes the most efficient.

Senator ALLOTT. Would it be safe to say in this area you might have two companies with comparable deposits, both with the same size leases, and the company which operated most efficiently would pay more royalty to the Government than the other company and, in effect, place the first company in an unfair economic position.

Mr. JONES. Yes. By collecting more royalty from the efficient producer his competitive advantage would be cut. At the same time, this would reduce him closer to the mediocre performer. The Government will still collect a lesser amount from the poorer producer, and the poorer producer would have less incentive to improve his operations.

Senator ALLOTT. You have stated that there are approximately 580,000 acres of land in this area owned by the U.S. Government, and you have emphasized in, I think, two or three places, and I think rightfully so, that one thing the people must be assured of is the opportunity of a clear title.

Mr. JONES. Yes, sir.

Senator ALLOTT. Otherwise somebody who had overfiled or something of that sort might have their filing sustained by a court, and then the company which had gone in there might be subject to paying considerable damages. I think this is a very valuable contribution.

But with the limitation of 5,120 acres, if you assume as much as 30,000 or 40,000 acres being leased by the Government under an oil shale program, you still are considering only a small part of that amount which is owned by the Federal Government.

Mr. JONES. Yes, sir.

Senator ALLOTT. With respect to this, I have been concerned with the question of getting into a position here where companies who are genuinely interested, who are willing to put up research money and develop processes—a lot of these patents are actually in the public domain now, are they not?

Mr. JONES. Some of them are; yes.

Senator ALLOTT. Some of them are. I have been concerned about the situation of making it possible for these companies who have a genuine interest whether or not they are going to be able to acquire leases in the public domain. I have a study by Mr. Cameron, who will testify later today, I believe, or tomorrow, showing the various private holdings in this area, and this does not happen to be your situation, I think. What would be the situation if a company which held private land there with relatively shallow beds, that is in thickness, should attempt to start upon the development of them and then later be faced with competition from someone who could get a lease of 5,120 acres in the deep and, for the most part, richer shale beds which lie deeper in the Piceance Basin? Wouldn't this make an unbearable economic hazard or would it?

Mr. JONES. Well, as you correctly point out, we are among the have-nots in this area, and do not own any such lands. We are talking about the south part of the Piceance Basin, toward the outcropping.

Senator ALLOTT. Yes.

Mr. JONES. So I can only theorize on this since we do not have immediate personal interest in this problem.

But it would seem to me that you have stated it just right. A company faced with making a decision of putting a substantial amount of

money into a plant—I believe a figure was quoted this morning of about \$125 million for a 50,000-barrel-per-day plant, and I think this is in the right order—would cause a prudent company management to assess very carefully the position it might find itself in a half dozen years in the future when we have such questionmarks as persist at the present time as to the role of the Government in carrying out research and making information commonly available to all participants or all potential participants.

Senator ALLOTT. In these areas some of the beds are relatively shallow—you say 50 feet of recoverable 20–25-gallon oil, whereas in the deeper parts of the basin, the beds go up in excess of 1,500 feet in thickness with shale which will run as high as 50 or more gallons per ton. A person or those companies with holdings in the southern part of the sector, along the outcroppings, would almost need to know for certain whether or not they could participate in the leasing and development of the deeper, thicker, and richer beds, would they not?

Mr. JONES. Certainly I agree with that. I think, to make the principle here, Senator, what would be important to me is that I would like to have a little assurance about what the running rules of the whole game are going to be a little bit further down the road.

The worst possible position that a company can find itself in is to be trying to make investments for the future knowing that there are a number of factors that will be extremely important to it, and not having any notion as to what the running rules on these other factors are going to be.

Now, certainly in this case we are looking at here, with the vast public lands just to the north of the lands you are describing, what is going to happen to these public lands is or should be of deep concern to the holders of private lands in the south.

So, although a person might not have to know exactly whether or not he could lease some of these Government lands, he would surely want to know what was going to happen to the public lands and what impact this would have on him from a competitive standpoint as the future unfolds.

The important point is that you need to know what the running rules are to have them nailed down, so that you are sure of what environment you are going to have to operate in.

Senator ALLOTT. Well, you are really getting to the point I wanted to make—and I am glad you did not steal my punch line completely—which is that if a competitive leasing system were set up and the Secretary decided that a certain number of acres were to be set aside for competitive bidding, that anyone who is genuinely interested and had the need and the ability, could pretty well determine where they were in the situation I described.

Mr. JONES. Yes, sir. And then the bid prices would reflect the very best assessment of the relative values of the lands involved, just as they do in the Outer Continental Shelf bidding.

Senator ALLOTT. And you feel that the research lease could be surrounded with sufficient certainty so that if the people did not perform real research, if they did not pursue it with diligence, if they did not come up with viable, economic methods, that the lease could then be canceled.

Mr. JONES. Yes.

Senator ALLOTT. Or brought to a conclusion so that the interest of the public could in all respects be protected.

Mr. JONES. Yes, sir.

Senator ALLOTT. I think that is all I have, Mr. Chairman.

The CHAIRMAN. Dr. Jones, you recommended a royalty of 5 percent. The leases in connection with the Outer Continental Shelf are not less than 12½ percent. They are presently set by regulation at 16½ percent. You refer to this in your statement. What is the reasoning by which you come to this 5 percent figure?

Mr. JONES. Five percent, as I understand it, is a royalty that is applied to many minerals. This is not oil in the form of liquid hydrocarbons.

The CHAIRMAN. No; but the end product is oil.

Mr. JONES. The end product is oil. But we are talking about what you are starting with here, and, in our opinion, a lower royalty payment would be conducive to developing the shale oil industry at the most rapid pace.

Now, as I have indicated earlier, to the extent that technical development allowed improved profits from this operation this, if we have any confidence in all of the past performance in such areas, would be reflected in bid prices on the lands that the companies leased from the Federal Government for development.

Admittedly, you can exchange the one for the other, and in the final analysis, I suppose, they are interchangeable. But as a system, I think we would be better off with a low royalty payment and look forward to the lease bids as being a common denominator so far as getting the best value for the Federal Government.

The CHAIRMAN. How do you answer the contention that we are dealing with known reserves here so you do not have the exploration costs? You do, however, have the development costs, which are substantial because we are dealing with a whole new problem, both from the standpoint of research and from the standpoint of technology.

On the other hand, in the offshore operations I would suspect that the exploratory work is much more expensive. You are in deep water, you are getting into deeper water, you have all sorts of problems which you do not have in a land-based operation. How does one respond to that kind of contention?

Mr. JONES. Well, I do not know that I can. I see little in common between the offshore operations and the shale oil development. The only thing I see in common are the principles which I have emphasized of competitive bidding for Government lands.

It is quite true that no exploration, or essentially none, would be involved in the shale oil development. You know where it is. There is a lot to be learned about its characteristics which you might call exploration, but which might more properly be called development.

But beyond the principles of lease acquisition, it is very difficult to compare these two areas. They are essentially different.

The CHAIRMAN. I agree. But we have a higher royalty on the offshore production, which is in a more difficult area, than we have on the continent and the costs of exploration and operation offshore are substantially greater are they not?

Mr. JONES. This is true.

The CHAIRMAN. There are many new problems of engineering and technology when you are prospecting in deep water. Also, offshore from Alaska you are dealing with real problems of extreme tides, ocean currents, and so on.

I just pose this question. I do not know the answer, but it would seem to me there is some relationship, although the problems are different. We are dealing with problems, and we are dealing with the requirement of additional expenditures, and that is why I raise the question about the 5-percent figure.

Mr. JONES. Just as I have pointed out that the royalty payments on oil from shale would enter into the total economic picture, so today the royalty payments on offshore oil enter into the economics there. These two are reflected in any bid prices for the lands.

I find myself a little bit at a loss as to how to pursue this comparison, though, because I could just as well extend it to sand and gravel or other minerals that are mined in much the same way that oil shale would be mined, and here the 5-percent royalty has been the traditional level for this kind of extraction industry.

So you can make this kind of comparison with a lot of things that are more nearly like the extraction of oil shale from the ground and by the same techniques.

Senator ALLOTT. Mr. Chairman, could I comment on this just very briefly? I think it would be well to have the staff prepare a more inclusive statement than I have found here just in a moment. I think that where the recovery of minerals from the ground is, and the mining is a significant factor, that the lower royalty has been utilized as opposed to the 12½ percent or 16 percent.

I was looking here at title 30 of the United States Code, section 262, relating to sodium. I think we ought to have the staff get these other minerals.

The CHAIRMAN. I think this is a very important point because it is hard to remember that varying applications apply under the Mineral Leasing Act, as it relates to the Outer Continental Shelf. We will have this prepared.

(The information requested is as follows:)

Minerals subject to leasing under act of Feb. 25, 1920 (41 Stat. 437; 30 U.S.C. 181 et seq.) and under the Acquired Lands Act of Aug. 7, 1947 (61 Stat. 913; 30 U.S.C. 351-359)

	Royalty rate	Statute citation
Oil and gas (competitive).....	As fixed in lease with 12½ percent minimum.	Sec. 17 M.L.A. (41 Stat. 437, 60 Stat. 950; 30 U.S.C. 181).
Oil and gas (noncompetitive).....	12½ percent	Do.
Coal.....	As fixed in lease. 5 cents per ton minimum.	30 U.S.C. 207.
Potash.....	Not less than 2 percent of gross value at point of shipment.	44 Stat. 1057; 30 U.S.C. 282.
Sodium.....	do	41 Stat. 443, 45 Stat. 1019; 30 U.S.C. 262.
Phosphate.....	do	41 Stat. 440; 30 U.S.C. 213.
Sulfur.....	Fixed in lease. No minimum established.	44 Stat. 301.
Oil shale, native asphalt, solid and semisolid bitumen and bituminous rock.	Fixed in lease. No minimum.....	30 U.S.C. 241.
Outer Continental Shelf.....	Not less than 12½ percent.....	

Senator ALLOTT. Just for the sake of the record at this point, the statement provides for a royalty of not less than 2 percent of the quantity mined on sodium. So this would lead to one question, which my friend from Wyoming, if he would permit me, I would like to ask, and that is, would it be of considerable assistance in this area if we were successful in moving the present 15 percent depletion allowance from the point where it now applies, which is at the point of removing the shale or marl from the ground to the point of the first retorting.

I think you referred to this, at least indirectly, in your statement.

Mr. JONES. Yes, Sir.

Senator ALLOTT. Would this be of some assistance to you? The Secretary did not comment on it this morning, and I personally feel that it is one of the important aspects of this development.

Mr. JONES. There are two obviously important points. One is the determination of the amount of royalty, whether it be 5 percent or whatever, and the other is the point of application; and what we have recommended is that the gross value of the first products recovered from retorting be the point of application.

Senator ALLOTT. So that would be the product first retorted, or in the case of *in situ* retorting—

Mr. JONES. The first liquid received at the wellhead.

Senator ALLOTT. The first liquid received at the wellhead.

Thank you.

Mr. JONES. Excuse me, I am told by Mr. Sloan that what I said was about right. On most minerals extracted from the ground by the traditional mining methods, royalties run up to 5 percent. It is generally 5 percent or less, and this has been the basis of these decisions on mining.

The CHAIRMAN. Dr. Jones, we want to be fair. After you have seen the record if you wish to supplement your remarks in any way, you may do so. That applies to all witnesses.

We are trying not to ask pointed questions, and to avoid placing anyone in a position where he may not have an immediate answer. What we want, more than anything else, are the facts. We are in a new area with a lot of new problems, and we cannot do our job unless we get the information. We want as much information as we can possibly assemble.

I have just one other question, Dr. Jones. How do you feel about the need for a Federal recordation statute in connection with the applications for mining claims in the Green River Oil Shale formation?

Mr. JONES. On this, I suspect my supplemental statement will be more intelligent than the one I can make right at the moment.

From the little that I know about it I do not think that this is needed in connection with clarification of the status of these oil lands. Adequate information, procedures, knowledge are currently available to proceed with this at the present time.

The CHAIRMAN. I will appreciate having your comments because the Secretary has some real problems when so many claims, as he indicated here this morning, have been filed.

As you know, at present each county, and State has different recordation provisions and different rules that apply.

Mr. JONES. I do wish to file a statement on it. I think we know where ours are, and we have all the information needed to clear them up.

The CHAIRMAN. I would suspect that you know what property you have.

Senator Hansen.

Senator HANSEN. Thank you, Mr. Chairman.

Let me compliment you on a very excellent, definitive statement, Dr. Jones.

I do have some questions that I think follow along those that have been asked with reference to the royalty rate, and I note, as has already been observed, that you recommend that royalty rate of a fixed amount not to exceed 5 percent.

Obviously, the public is interested in maximizing the royalties that would accrue to the Federal Government, and I have no argument at all with that concern.

I would like to observe, however, and ask you if you would not agree with me, that there are other equally valid public concerns, one being, should we not be quite concerned over the complete utilization of these oil shale resources.

May I add to that by way of clarification, my belief that any fixed costs that are part of the retort operation, or whatever it may be, could well determine the extent to which the resource is completely utilized.

I am familiar in my State of Wyoming with secondary recovery operations, and tertiary recovery operations, and the breaking point occurs when the cost of bringing a barrel of oil above ground and refining it will not repay all of the other costs that have gone into it, including interest on the investment. When that point is reached, it becomes very marginal.

Now, we are leaving, and I understand this is true not only in Wyoming but, perhaps, in the many other States as well, oil underground that could be brought up if you want to spend enough money to bring it above ground, but if it cannot be brought above ground so as to return a profit to the oil company, it is not going to be brought above ground.

Would you agree with me, this ought to be part of the consideration, public consideration, in the resolution of this royalty rate question?

Mr. JONES. Yes. And if I tried to talk on it, I think I would repeat what you said, Senator. This is, I feel, appropriately a consideration that a group such as yours should take into account, because it is part of the environment in which the company operating will make its economics and determine its course of action.

Senator HANSEN. I heard estimates made that we can probably produce not fewer than 80 billion barrels of oil, as I recall, from our present projections of the application of our technology on this resource, and up to as many as 2 trillion barrels. I do not know how much will be produced, but I suspect that the amount that will eventually be produced will reflect a number of factors, and included in those will be the cost of the royalty return that must go to the Government.

Also, there is another area of proper public interest, and that is, I feel, that the public generally will benefit from the production of a low-cost fuel, so that we may think about the ultimate tax take in

the way of this royalty that goes to the Federal Government, on the one hand; and we ought not, in considering that, overlook the obvious advantage, on the other, wherein we provide or we produce as much oil as possible at the cheapest rate possible.

So that what we may lose on the one hand could well, indeed, it seems to me, be returned to the public on the other. Would you agree generally with that statement?

Mr. JONES. Yes. I think that you have brought up an extremely important principle, and that is that the total economy benefits in a variety of ways from a commercial venture. We have emphasized here the royalty payments and the bonus payments but there are many other aspects of it. You are right.

Senator HANSEN. I think one other area that concerns me is that I look upon the creation and the operation of this oil shale industry as an added way to provide jobs for Americans, to add to our tax base in this country.

We might go abroad, as we have been doing, and as we were brought up short with the trouble in the Middle East, to recognize that our security may hang at times on a very tenuous reed when we become too dependent on foreign sources of supply.

But I think there ought to be something said, and it ought to be noted that when we develop an industry, and if we maximize that development in this country we are going to benefit, the public would benefit, in a great number of ways. We are going to create jobs here in this country. We are going to add income to our economy—I do not know whether I said tax base or jobs, but they go hand-in-hand. All of these things can happen, and I say this because in observance of the application of these public land laws and with specific reference to my own State of Wyoming, I know we have been concerned about the revenues that accrue to the State and county governments in Wyoming from the rental and use of our State-owned lands.

There are those who say these rentals have not been high enough. But I think a far more important consideration is what happens when these lands are put to use. It is interesting in this connection to recognize that the rental which accrues to the State of Wyoming in many instances is a very small part of the great good that accrues to the State of Wyoming and to the school districts, and to every other arm of government as you think of all of the series of processes that take place when you get something going on public lands, and I think this applies here.

I would invite your observation if you feel that that is right.

Mr. JONES. Well, I could not agree more with any set of principles than the ones you have been enunciating.

To put this into one set of terms, I suppose the development of a 100,000-barrel-per-day plant of shale oil would probably generate a community of between 15 and 20 thousand people.

Senator HANSEN. I know a number of studies have been made in this whole area of the economics of the oil industry.

Within the last few weeks, I understand three companies or consortiums, or maybe individual companies, have indicated they are

going to build some refineries in Japan, taking advantage of the increased demand for petroleum products over there.

I understand Chase Manhattan, and they have a representative who will be testifying here later on, either today or tomorrow, that, generally speaking, as they have studied 29 or 30 major international oil companies, their studies indicate that a company must have a profit margin of around 12 percent if it is going to be successful and continue to meet the competition of well-managed companies.

Did I understand your testimony correctly when I inferred that, as you look at it, there would probably not be sufficient profit incentive in an oil shale operation to stimulate much interest with the rates as they were suggested by the Secretary?

Mr. JONES. The royalty part of it is part of the package that we feel in toto would tend to hold development of oil shale back.

As I stated previously, given the right kind of guidelines it appears that an oil shale industry might be developed on the basis of reasonably anticipated technology in the short-range future, such as the next decade, that would be competitive with the average of mining and manufacturing, which is in the neighborhood of 12 percent or maybe a little bit better.

Now, it seems pretty obvious to me that a new industry, which obviously has hazards that the traditional industry does not have as many of, is going to have to hold out the promise of as good a return on capital as going into another industry or capital will not flow into it. This is fundamental to everything I have said.

Senator HANSEN. Well, in that connection, I note that some of the oil companies are acquiring substantial coal leases in my State. I think your company may be one; am I right, that you have?

Mr. JONES. You are correct.

Senator HANSEN. Would it be fair to say that whether you go further into the hydrogenation of coal—maybe I should not say further—but whether you go into it or not, I am aware that our State university and the Bureau of Mines Laboratory on our university campus has done some good work in this area—whether you go into that or whether you might come into the Athabaska tar sands up in Canada, or whether you would give greater attention to uranium—and we have got quite a uranium boom going on in Wyoming now—I suspect which way you go will reflect your judgment as to where the greatest opportunity for profit lies. Would that be fair to say?

Mr. JONES. That is a very fair statement. I think it is important here to articulate one point with which I am sure everybody would agree. Although we do not know exactly what the growth of energy demands is going to be, we are pretty sure they are going to keep growing, and we can be positive that it will be met. As a gap develops between traditional suppliers of energy and the total demand, the system will make up the gap, and if it does not come from one source it will come from another.

Now, not referring to operations in my specific company but in the industry as a whole, industry will move to supply the requirements that the economy puts on it, and if, for one reason or another, development

of shale oil is held back, this simply means, by inference, that some other supplier of energy will move in to fill the gap.

You imply this energy source to be coal, and it could be. You also indicated other courses of action which might develop, some of these being outside of the purview of the domestic companies.

But the facts are that the gap will be met, and if the gap is met by the promotion of something other than shale, with a delay in the development of shale technology, it obviously would be fighting an uphill battle to come into the picture at a later date.

Senator HANSEN. I appreciate your response to that question.

I would just like to observe, in closing, that as nearly as I can determine, there have been any number of experts who have tried to differentiate between our accomplishments in this country and the accomplishments of other countries, and although they do not agree in toto, I think there has been substantial agreement on this fact: and that is, that Americans have at their command a greater energy source than does any other country, and I suggest that it is very clearly in the national interest not to minimize the future potential of that energy resource, but rather to make it as great as we possibly can.

I recall a few years ago that it took about 48 percent of the total labor force in Russia imply to provide sufficient food and fiber for the needs of the Russian people. We can do it with maybe between a sixth and an eighth of that number, and I am inclined to think it is because we have a lot of tractors around, we have a lot of electricity around that other countries do not have.

I would hope that in our desire to develop this great resource we would bear in mind that this is the important consideration: we should not lose sight of—and let us not fool ourselves into thinking that our major concern is to try to see how many tax dollars, how many royalty dollars, we can take directly from the industries that are developing this resource and put them into the Federal Treasury—the jobs that we can create, the tax base that we can build, the homes that we can provide, all of the other things we can do if we do this job well and make it as attractive as possible for industry to do the job that I am sure it will do if given the green light.

You made an excellent statement, Dr. Jones, and I appreciate it.

Mr. JONES. Thank you. I wish I had been foresighted enough to include your last statement in my remarks.

Senator Moss (presiding). Thank you, Dr. Jones.

I heard your prepared text, and then I had to leave the hearing room during most of the questioning. I do think you have made a great contribution to the record, and we are glad to have it. It represents the position and point of view of a great company, actively involved in the petroleum field, in both shale research and development as well as the production of petroleum, so your practical recommendations are certainly helpful to this committee. We do thank you and your associates for coming here.

Mr. JONES. Let me again thank you all for the privilege of being before this panel.

Senator ALLOTT. Thank you, Doctor.

(Subsequent to the hearing, the following additional statement was received:)

FEDERAL OIL SHALE PROGRAM

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Hon. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

HUMBLE OIL & REFINING Co.,
Houston, Tex., October 26, 1967.

DEAR MR. CHAIRMAN: In response to your suggestion made during the oil shale hearings held by your Committee on September 14, I would like to submit this letter as a supplemental statement for the record. You indicated that such a procedure would be acceptable.

During the question and answer period following my testimony, I was asked to explain why we feel that a royalty rate of 5 percent should be applied to shale oil production from public domain lands as opposed to the 16 $\frac{2}{3}$ percent royalty that is applied to oil and gas production on Federal submerged lands on the Outer Continental Shelf. As you recall, our position was that a royalty rate of up to 5 percent should be imposed which is more traditional for the types of extractive industries that are more comparable to the oil shale industry. These include phosphate, sodium and potash, which also come under the Minerals Leasing Act. Fundamentally, the oil shale and offshore oil and gas operations are completely different. In the case of offshore operations, high risk factors exist in locating and proving the presence and productivity of the minerals sought. However, once the presence of the mineral is proven, the state of the art for production is well-advanced and the unit cost to produce a barrel of oil or a thousand cubic feet of gas is relatively nominal compared with the product value and is predictable with a fair amount of certainty. Conversely, in the case of shale oil, the mineral has already been located thereby necessitating a very minimal amount of exploratory activities. On the other hand, in the case of oil shale, a high unit cost is required to produce a barrel of oil because of the complex production operations that require mining, crushing, retorting, upgrading and disposal of large amounts of waste material. In addition to the very complex production operations involved, the state of the art for producing oil from shale is an embryonic stage, and the costs are difficult to predict. Hence, the great risks that are associated with producing oil from shale are related to the production operations and are not greatly influenced by exploration activities.

The less favorable unit of production costs for shale oil and the technological uncertainties, as opposed to offshore or other conventional production, present a major barrier to the development of an economically viable synthetic oil industry. The technological risks and high operating costs for shale oil coupled with a burdensome royalty rate, will place it at a distinct competitive disadvantage which will seriously reduce the commercial attractiveness of shale oil and therefore postpone needed research and development efforts and investment.

During the colloquy on royalty rates, one of the Committee members expressed an interest in royalty rates for other hard rock minerals in the public domain lands. We have surveyed these royalty rates and compiled them in the tabulation attached hereto entitled "Comparative Royalty Rates". The minerals listed in the schedule are all those leasable under the Mineral Leasing Act of 1920 as amended. All other minerals produced from Federal lands such as copper, uranium, zinc, lead, iron, stone, sand, gravel, and many others, are subject to location under the mining laws of the United States, and are produced free of royalty.

During the question and answer period, an inquiry was also made as to Humble's position on the need for a Federal recordation statute such as S. 1651 which was introduced at the request of the Department of the Interior. This bill, if enacted into law, would require a declaration of interest to be filed with the Secretary of the Interior with respect to all mining claims on public domain lands. At present, all mining claims are required by state laws to be recorded in the appropriate county records. Since these county records are available to the public, we do not believe that the enactment of legislation such as S 1651 is necessary for prompt determination of questions of validity of existing oil shale mining claims by the Department. This bill would, of course, centralize the recordings and eliminate the necessity for examination of individual county records to obtain information as to mining claims. Insofar as the bill applies to oil shale, we would not oppose its enactment, particularly, if the Secretary feels that it would expedite the prompt determination of the validity of the many oil shale mining claims now in contest.

Sincerely yours,

CHARLES F. JONES.

FEDERAL OIL SHALE PROGRAM

Comparative royalty rates

Mineral	Royalty required by law	Royalty currently imposed by Federal lease	Comments
Oil and gas: Onshore, not within known geological structure of producing oil and gas field.	12½ percent-----	12½ percent-----	Graduates according to daily average production.
Onshore, within known geological structure of producing oil and gas field.	Not less than 12½ percent.	From 12½ to 25 percent.	
Outer Continental Shelf lands.	-----do-----	16¾ percent-----	
Coal: Mined by underground methods.	Not less than 5 cents per ton.	15 to 20 cents per ton.	Royalty varies from 2½ to 10 percent depending upon coal quality and location. Royalty varies from 3 to 9 percent depending upon coal quality and location.
Mined by stripping-----	-----do-----	17½ to 22½ cents per ton.	
Phosphate-----	Not less than 5 percent of gross value.	5 percent of gross value but not less than 25 cents per ton.	
Sodium-----	Not less than 2 percent of gross value.	5 percent of gross value.	
Potash-----	-----do-----	-----do-----	

Senator Moss. Our next witness will be Fred Hartley, president of the Union Oil Co. of California. Mr. Hartley, would you come forward, please.

We are pleased to have you, sir. If you have any associates accompanying you, they may come to the table also.

Would you introduce your associate. We are happy to have him.

STATEMENT OF FRED L. HARTLEY, PRESIDENT, UNION OIL CO. OF CALIFORNIA; ACCOMPANIED BY HAROLD H. STREAM, MANAGER, OIL SHALE ACTIVITIES

Mr. HARTLEY. I would like to introduce Harold Stream, who is manager of our oil shale department, and I am sure he works full time, along with his mining engineering associate in coordination with our research department and other technical arms of our company, with the responsibility to keep going forward in the area of oil shale development.

Senator Moss. Thank you. We are glad to have you, Mr. Stream.

Mr. HARTLEY. I am honored to have been invited to appear before you today and I appreciate your consideration in scheduling my appearance so that I may return to the west coast this afternoon.

Union Oil Co. of California first became interested in oil shale about 1915. In 1920, it established an oil shale department headed by Rod Burnham. Incidentally, I am happy to report that Mr. Burnham celebrated his 80th birthday last year by taking a boat camping trip down the Colorado River. It must have recalled memories to him because from that river you can see the outcroppings of the Piceance Basin oil shale field.

Mr. Burnham and his staff set up an office in Denver in 1920 and immediately commenced investigating the oil shale country. A mill-

site was purchased and by 1925 about 20,000 acres of patented oil shale lands, including bottom lands, had been acquired. In the meantime, Union was also pursuing its study of retorting methods in this country and abroad.

With the advent of the great eastern Texas fields, followed by the fields in California, activity in oil shale slowed down but did not stop. Union continued to acquire oil shale lands, water rights and to study developments in the field of retorting.

With the onslaught of World War II, Union accelerated and expanded its oil shale research and development program. As a result, a novel underfeed-type retort was invented and recently emerging catalytic hydrogenation techniques were successfully applied to oil shale.

After the war, Union continued its pilot plant study on retorting and refining with such success that it felt justified in constructing a shale demonstration plant on its Colorado properties in 1955. That plant cost \$3.5 million. The operation of the demonstration retort resulted in many improvements and innovations. The capacity of the retort was finally established at substantially over 1,000 tons per day.

Concurrently, Union continued experimenting and developing with underground mining techniques at a near commercial level and shale oil refining processes were confirmed at pilot plant levels. All in all, Union's expenditures on the oil shale project at this point had reached about \$10 million.

In 1958, the demonstration plant was shut down; however, evaluation of results was continued in Union's research facilities in California. As a part of its continuing oil shale effort, a commercial demonstration of shale oil refining was carried out in cooperation with the American Gilsonite Co. in the Gilsonite Refinery in Colorado in 1960. In this operation gasoline and distillate products were produced and marketed in the local area.

During the period from 1960-64, Union's efforts were principally in the area of mechanizing oil shale mining and perfecting its titles. Since 1964, Union has been expanding and accelerating its activities in the field of oil shale. A large part of its expenditures have been on account of litigation with the Department of the Interior involving the status of unpatented claims. It also has investigated and is investigating other types of retorting, both in this country and abroad.

The rest of my remarks will be addressed to the regulations proposed by the Department of the Interior for leasing a limited area of Federal oil shale lands under the Mineral Leasing Act of 1920.

Union Oil Co. of California urges support of the leasing of Federal lands under proper and fair regulations. This would be a giant step toward the development of viable shale oil industry which will benefit U.S. national security, its economic growth, and its supply of foreign exchange.

Union believes the proposal for leasing Federal lands to private enterprise is particularly appropriate. It believes the industry could not be developed faster or more economically by any other means. For all these reasons, and in view of the public interest—and I add public criticism—which any step toward opening the Federal shale reserves will provoke, the decision of the Secretary of the Interior to proceed and the issuance of proposed regulations merit commendation.

It is a source of dismay, however, that the proposals are so drafted that no businessman would be likely to risk his time and money in shale oil if he had any reasonable alternative.

Shale oil is an emerging industry. Extraction and refining of shale oil has not yet been achieved in this country on a commercial scale. I am sure they will be. The industry needs a substantial investment of time, manpower and money, backed up with a good share of stockholder patience. In our opinion, the proposed regulations fail to set the necessary framework for development of an oil shale industry. I will comment on various aspects of the proposed regulations and offer our suggestions for improvement.

1. The Department's proposal for selection of acres for leasing provides that the Secretary will publish notices from time to time designating areas for the conduct of particular types of mining, extraction or processing which will be made available for leasing. Areas are to be selected with a view to encouraging research on a variety of mining and processing methods under a variety of conditions, taking into consideration principles of conservation and environmental protection. No more than 30,000 acres are to be so designated.

We suggest the following selection procedures as preferable:

(1) A committee composed of representatives of the Bureau of Land Management, the Geological Survey, and the Bureau of Mines prepare a leasing map of oil shale lands divided into blocks, each of which, in the opinion of the committee, would constitute a logical and economically feasible development tract.

(2) Each block limited to either about 5,000 acres maximum, or or lesser acreage containing not more than about 1 billion barrels of economic reserves—and I add at this point economic reserves usually are considered to be those reserves that contain 25 gallons per ton of shale oil potential or higher.

May I explain at this point also, because of the varying depths of the oil shale seams, I think there has been some reference to that today, some seams are as thin as 30 feet, some 60, some 100, some up to 2,000, and obviously, if you gave a lease out of 5,000 acres and a 60-foot seam, that would contain, let us say, x barrels of oil.

If you gave out a lease which had 2,000 feet of thickness and you gave out 5,000 acres, you would give 2,000 divided by 60, some approximately 33 times as much oil to the potential leaseholder. So we think, naturally, in the public interest the Secretary of the Interior should be able to vary the acreage depending upon the quality of the shale oil reserves underneath the particular block outlined by the committee that I previously described.

The CHAIRMAN (presiding). Mr. Hartley, on that point, is the information regarding the formation of the geological area we are talking about known, in the judgment of industry people like yourself?

Mr. HARTLEY. I would think that the people in the Bureau of Mines, Geological Survey people, have spent a lot of taxpayers' money getting this information, and I consider it to be pretty reliable; at least within the degree of accuracy that is required here as to whether you are talking about a billion barrels or 900 million, and I do not think that is of particular concern. The area in general, the geological formation, is pretty well known.

I hasten to add, however, that if that were a concern, a man could be given a provisional lease of 5,000 acres on the assumption that the geology was such and such. If he happened to get a windfall and found out the geology was 50 percent one way or the other, perhaps then he would get a further opportunity to adjust his acreage holdings. I consider that to be a mechanic and not of any great concern.

I think the key point is, 200 acres with 2,000 of thickness equals about a billion barrels of oil, whereas 5,000 acres with 60 feet of thickness equals about a billion barrels of oil.

Senator ALLOTT. Mr. Chairman.

The CHAIRMAN. Yes, Senator Allott.

Senator ALLOTT. I think, in view of the fact that many people who might read this record might be somewhat confused by this, it should be made perfectly clear that there is no such thing as uniformity throughout this entire area, either as to thickness of the shale formation or as to the kerogen content of the shale. Would that not be true, Mr. Hartley?

Mr. HARTLEY. Well, Senator, within a given area, in fact, the only thing that really makes the entire shale oil mining and retorting system viable is the fact that Mother Nature has been pretty uniform.

If it were not so, I think the entire subject would be only of academic interest. We today in our mine and other mines that I have inspected, including the Bureau's, are impressed with the tremendous uniformity of the oil shale deposit. We are somewhat appalled at the lack of uniformity of the roof structure and the hazards involved in mining potentiality of roof falls, and so on, which perhaps corresponds to the failure of oil wells after being in production for some time, due to sand falling back in, and so forth and so on.

I do not mean to say there is not the hazard within the oil shale operation, but Mother Nature has done a pretty good job of being uniform within a given area.

Senator ALLOTT. Let me make my point very clear here because there will be a great many people who will read this record who have never seen any kind of a mining formation. But you have formations running all the way from 25 feet in thickness up to possibly as high as 2,000, that you have proven out, I think, and find the facts to be that very little runs 2,000 feet in thickness.

It has been estimated that some of it runs as high as 70 gallons per ton. But how much can be proven out at 70 gallons per ton is at the moment more or less a speculation also; is it not, as of this moment? Or do you feel you know? I have been told that all of the private drilling there together cannot definitely define these areas.

Mr. HARTLEY. I think that the various parts of the basin have to some degree been explored, some more than others, and I am not trying to say that the entire area is uniform.

What I am trying to say is that if there is a 60-foot seam in a given area of 5,000 acres, that that particular seam is relatively uniform.

Senator ALLOTT. Right.

Mr. HARTLEY. And that there could be a 2,000-foot seam area within, let us say, some limited geography, I do not know exactly how many acres, it could be only 200 or it might be 5,000 that, too, would probably be quite uniform. Are we together now?

Senator ALLOTT. Yes, I think we are together. The thing that I wanted to negate was the concept that some people might get that this was just a uniform strata with a uniform quantity of kerogen in it, and that it did not vary.

Mr. HARTLEY. Going on here, on point 3. First, to recapitulate here, we suggested that the leasing map of oil shale land divided by blocks be prepared. Secondly, that we establish the size of these blocks in the way that I have indicated; and then, point 3, blocks be designated by numbers, as is the practice in oil and gas leasing on the Outer Continental Shelf, and leases be issued only for whole blocks.

(4) The Bureau of Land Management then called for nominations of blocks to be offered for lease and the Department of the Interior select the blocks to be offered, taking into consideration the factors suggested in the Department's proposal and the blocks nominated.

We see no justification for limiting the offering to a maximum of 30,000 acres or any other amount. If the suggestions for leasing and lease terms, which I will discuss later, are followed, the Government's interests will be adequately protected and abuses avoided.

The Department proposes an initial "research term" covering a designated portion of the leased property for a period to be designated by the Secretary, not in excess of 10 years. The lease is subject to extension for a "commercial production term" so long as mineral products are produced from oil shale in paying quantities. The extension occurs only if the Department finds the lessee has conducted its research activities in accordance with the plan set forth in its application and has "in the course of the research term" developed a mining and processing method which is:

- (1) commercially feasible;
 - (2) provides for optimum recovery of minerals to be produced;
- and
- (3) meets the Department's requirement regarding prevention or minimization of air and water pollution. Read literally, those lessees who had developed mining and processing methods in years past would not be eligible for extension for commercial production.

The lease may be extended for the commercial production term only with respect to the area which contains the quantity of mineral deposits determined by the Secretary to be needed for commercial production, allowing reasonable reserves.

The Department proposes an annual rental of 50 cents for each acre or fraction thereof. Apparently, this rental is to be calculated on the entire area covered by the so-called lease, even though only a small fraction is immediately available to the lessee and even though only a portion may ultimately be available for commercial exploitation.

The Department makes no express provision for any work obligations. Possibly they are to be inferred from the requirement that the applicant described its plan of research and development during the research term and the general nature of the commercial operation sought to be developed.

We believe the foregoing provisions are unrealistic, inequitable and unworkable, and propose the following instead:

1. Leases be issued to qualified applicants covering a specified block or blocks for an initial term of about 10 years at fairly high minimum

rentals in the range of \$250,000 to \$500,000 per year. Higher rentals could be bid and would be a factor in evaluating bids. Amounts actually expended on research and development of the leased properties or their commercial exploitation would be credited against rentals. After production has been achieved, rentals would be credited against royalty payments. Applicants would be limited to a total of about 5,000 acres maximum, or lesser acreage containing not more than about 1 billion barrels of economic reserves—25 gallons per ton or higher.

2. Recognition be given to those companies who have expended substantial sums in the past on the development of oil shale mining and processing techniques by permitting them to credit at least 50 percent of such expenditures during the past 20 years against their rental obligations.

3. If, at the end of the initial term, commercial production is underway on a particular block, the lease as to that block would remain in effect so long as such commercial production continues. Absent commercial production, the lessee would have the option to extend the lease term for not to exceed two periods of 5 years each, at an escalating rental subject to the same credits as those permitted for the initial term; in other words, again, to provide dollars to conduct research.

I might add at this point that I would be entirely opposed to a bonus per se because I think the objective of the Department of the Interior is to get the shale off the ground.

The way to get shale oil off the ground is to get the maximum number of people, corporations, entities of all sorts, conducting research and development, and I would like to see every dollar spent go into research and development, not to the U.S. Treasury for various other purposes that you gentlemen sometimes approve.

Union believes these procedures would (1) stimulate the lessee to achieve commercial production as soon as possible, (2) discourage speculation and speculators, and (3) assure return of acreage to the Government within a reasonable period if commercial production or substantial efforts therefor were not achieved within a reasonable time.

May I add, if a man fails to conduct his research work and does not pay this \$250,000 to \$500,000 a year out in research, and he has no program to do so, then I would propose that the terms of the lease would be such that he would forfeit his rights and the land would return to the Government to be put into the hands of other more serious-minded people who want to do something about oil shale.

Assuming each applicant could show adequate financial resources, awards should be based upon the size of the rentals offered which, while offered in terms of cash, could also be reasonably regarded as work commitments. While recognition would also be given to those who have spent their time and money on oil shale research and development during the past 20 years, the conditions proposed would prevent undue advantage.

As to qualification of applicants, the Department's proposed regulations are permeated with discrimination against those companies which either having existing oil shale acreage or other oil resources. For

example, (1) the proposed regulations state their purpose is to encourage participation by companies not favorably situated with respect to access to reserves of the minerals present in oil shale, (2) the applicant is required to set forth its interest in nonfederally owned oil shale lands and the reasons why it needs federally leased land for its proposed research and development, (3) in evaluating applications, the Department is to consider the applicant's need for leased lands to conduct its proposed research and development and projected commercial activities, as well as its need for reserves of the minerals proposed to be produced, and (4) the applicant is required to describe the reserves it then owns or controls of oil and other minerals of the kind believed to be present in the lands applied for.

This discrimination is not authorized by any provision of the Mineral Leasing Act of 1920 nor by any considerations of morality or equity. No criteria are established for determining what constitutes not favorably situated with respect to oil shale or need. Quite apart from the difficulties in orderly and fair administration of such provisions, they constitute an unwarranted administrative usurpation of the prerogatives of the legislative branch. The awarding of leases on Federal lands on the basis of need of the applicant from any viewpoint is novel and not designed to father a healthy new industry nor to assure to the Government the best return for its leases. As a practical matter, it would seem difficult to award bids at the same time on the basis of the other criteria established and of need. When does one outweigh the other?

The Department's proposed regulations provide for a minimum royalty of 3 percent of gross value at point of shipment to market of the mineral products from the oil shale.

Some lessees will doubtless mine oil shale, crush it and then retort it to obtain the material which, after hydrogenation, will be shipped to refineries. Others may well use some method of *in situ* retorting. Further definition of "point of shipment to market" is therefore needed to avoid inconsistent treatment and discrimination. Although the term mineral products from the oil shale apparently includes shale oil and other mineral byproducts of the retorting or other extraction process, the term should specifically include shale oil.

Oil shale is mined and processed to obtain shale oil and it is reasonable to recognize the value of the shale oil itself for the purposes of computing both royalties and depletion. Its value can at this point be correlated with the values of other known low-grade crude oils.

The regulations also provide that the annual net income royalty rate shall be a percentage of net income from production of mineral products from oil shale to the point of shipment to market. These rates vary from 10 percent of that part of net income which is no more than 10 percent of investment to 50 percent of that part of net income which is more than 20 percent of investment.

In effect, the 3-percent royalty is credited against the net income royalty. Net income is defined as taxable income computed without allowance for royalty and depletion and investment is defined as the original cost less depreciation of capital assets. Under this provision a successful operator will find himself in a bracket paying 50 percent of his pretax profits without allowance for royalty and

depletion plus at least a corporate income tax of 48 percent of his pretax profits remaining after allowance for royalty and depletion.

It is submitted that these rates are excessive and unrealistic; and, may I ad lib that it is well known that the Arabs are tough traders. But may I suggest Mr. Udall's suggested devices would receive the plaudits of Karl Marx if he were alive today and, no doubt, John Kenneth Galbraith, who is alive today.

We believe there should be one royalty rate based on gross value of the shale oil produced from retorting by whatever means.

We suggest that the royalty bear the same ratio to the rate of percentage depletion for income tax purposes established for shale oil as the customary 12½-percent royalty rate bears to the rate of percentage depletion established for oil and gas. And since it has been stated here, what is the royalty, is it an eighth or is it a sixth, that is 12½ percent or 16%, and since 12½ percent is given on land, 16% is given over water; if you would ask my opinion on that subject, I would say it ought to be the reverse of that. I think somebody brought that point out, and I certainly agree with him.

Nevertheless, whatever number is used is tied to the 27½ depletion, and if they want to give the shale industry 27½-percent depletion, then the royalty rate be either 12½ or 16%, depending upon the good judgment in that area. Presumably, if it matched up with land-based oil, if you were consistent, it would be 12½ percent.

I think one other point I would like to make at this point is, and that has been brought out from listening to testimony this morning, there seems to be a little bit of confusion as to what we are really trying to do here. As I understand what the Secretary is trying to do, he is trying to make lands available to encourage a research effort, and I am all for him on that. I do not propose bonuses at this time in what I would call phase I of the Department of Interior's program.

But I would, on the other hand, let people bid on the basis of what they are prepared to do in the way of making a definite contribution to the development of the industry.

Now, after this industry has been developed, there is still going to be about another 500,000 acres of this land left. Now, come along with your bonus program. Now the pioneering step is over and everybody and his brother will want to get in it at that point, and at that time, in order to determine who should get the leases, then bring on your bonus bidding at that time, because at that point you are not bidding to carry on a research program, you are bidding to go into commercial production.

The proposed regulations provide that lease royalties shall be subject to readjustment at 20-year periods succeeding issuance of the lease. The justification for this is not readily apparent. In addition, there would seem to be no justification for measuring the initial 20-year period from the date the lease issues, rather than from the date of the extension for the term of commercial production.

The proposed regulations require the submission of a final report on completion of the research plan. The report is to summarize the state of the art and to cover conclusions and recommendations and to include a complete detailed disclosure of all materials, processes, and equipment involved, and all the technical and financial data needed.

to enable any qualified person to carry out the work performed under the lease.

It is also to include recommendations for further improvements and such other representations and information as the Department may specify. Persons designated by the Department are to have access to all operations and facilities. No report may be copyrighted and the Secretary has the full right to publish, reproduce, and use, and to have others do so, the reports and any information obtained by the Secretary pursuant to his regulations. The Secretary must promptly publish reports received, and make other information available to the public.

These provisions are most objectionable. Each applicant, who has not already done so, will doubtless develop its own processes and technology through the use of its own funds. There is neither precedent nor moral justification for requiring it to share its hard-won knowledge with the Department or with others.

Provision is made for acquisition by the Government of title to all inventions made in the course of or under the research term of the lease. The lessee is required to issue licenses—at reasonable rates—on patents owned by it which are necessary to permit others to practice inventions made in the course of or under the research term. In the case of a proper showing of exceptional circumstances, the lease may contain provisions granting greater patent rights to the lessee.

Whatever justification there may be for such provisions in the case of contracts covering Government projects to be carried out by private contractors financed by Government funds, none exists in the case of a lessee of Government oil shale lands. In addition, they place severe penalties on those who, like Union, have pioneered in the field of oil shale mining and retorting and have achieved at considerable expense, their own patented processes and their own know-how.

These disclosures and sharing requirements constitute a serious bar to the future development of the shale oil industry and these restrictions should be deleted. Further, they encourage speculation by companies unwilling to commit their capital, and place the Government in the position of handing out windfall profits to inactive or unsuccessful companies.

President Johnson is reported as saying he doesn't think Middle East conditions require a speedup now in development of oil-bearing shale deposits in Colorado and neighboring Rocky Mountain States. But if U.S. petroleum supplies are threatened more than they are now, steps can be taken to develop shale oil faster.

I do not interpret the President's reported remarks as indicating any difference in views from those which I have expressed. So far as I am aware, there is nothing in the present Middle East situation which imperils the adequacy of petroleum supplies to meet the present requirements of the United States.

The situation does, however, point up our country's need for assurance of a high level of domestic petroleum supplies to meet vastly increased future requirements for civilian use, of which I am sure the President has knowledge from the Government's own economists. Moreover, there is always the possibility of substantially increased defense demands.

In the long run, all these requirements will have to be supplied from both crude oil and shale oil. I am sure all realize that a full-scale oil shale industry cannot be developed overnight and that it is going to require time and the expenditure of literally hundreds of millions of dollars. All that the Secretary of the Interior has proposed, and all that we are now discussing, is the first step, a step that the President indicates may break into a run if the country's petroleum supply is further threatened.

In summary: (1) We recommend the Secretary of the Interior for taking this first step toward the encouragement of a shale oil industry.

(2) We feel, however, the Department's proposed regulations have not been designed with intent to speed the development of a viable oil shale industry and are, in fact, unworkable.

(3) We believe the suggestions we have made are workable, will encourage neither speculation, discrimination, nor special advantage, and will expedite the emergence of a shale oil industry.

Gentlemen, in anticipation of possible questions you may have as to Union's current activity on oil shale and our attitude relative to its future, I would like to make the following comments:

A few months ago we announced plans for a new 140,000-barrels-per-day oil refinery near Chicago. Construction now estimated to cost approximately \$200 million is underway. You will be surprised and I hope pleased to know that we have incorporated into the design provision for processing 70,000 barrels per day of synthetic shale oil. Further, the shale oil feedstock will be essentially free of sulfur—a bonus of great importance in our concern with air pollution.

However, as a precautionary measure and in recognition of the failure of the executive branch of the Federal Government to establish a favorable and equitable climate for the oil shale industry, we are also designing the plant to process 70,000 barrels per day of synthetic tar sand oil from Alberta, Canada.

It is to our shame that our good neighbor to the north has pioneered the way in synthetic oil production while the Department of the Interior for the past 20 years has failed to provide the necessary leadership to create an atmosphere conducive to similar private investments in the United States. And may I hasten to add, American capital is primarily involved in the Canadian project.

In addition to a viable first phase leasing policy by the Department of the Interior, Congress and/or the executive branch must provide adequate percentage depletion applied to the raw shale oil. Further, industry must have stability and reliability in respect to the foreign oil import policy which has deteriorated into a chaotic political shamble over the past 3 years. Given an equitable environment, shale oil can be on the threshold of commercial reality. Do you not think the citizens of the State of Colorado and other Rocky Mountain areas are just as entitled to new job opportunities as the citizens of Alberta?

I think you will also be interested in our continued research activity. First, we have undertaken an experimental program on a retorting process developed in West Germany. Colorado oil shale arrived in that country quite recently and the program is now underway.

Second, further experimental work is underway in our laboratories at Brea, Calif., both on retorting and refining. And third, Union Oil

Co. of California recently—as a matter of fact, the agreement was signed last Friday—entered into a short-term lease agreement with Battelle Development Corp., an affiliate of Battelle Memorial Institute, under which Union is making its experimental site and shale mine in Colorado available on nominal terms to expedite Battelle's program for the development of a novel process for extracting oil from shale.

Even though we have our own proven retorting process, Union is vitally interested in fostering any developments which might speed up and lead to better and cheaper ways to commercialize the vast shale oil resources of the United States.

Considering, gentlemen, the never-ending tenuous world situations that the United States is confronted with, further indecision on oil shale policy is the height of folly. We are appreciative of the fact the Interior Department is moving. Let's, through industry-Government team effort, get going—in the right direction.

Now, I would like to present to you for your inspection an exhibit which I think you will find of interest. I am sure there is going to be some testimony given in the next 48 hours that will pertain to the beauty of Colorado, and believe me, as one who spent 5 years directing our shale research program in Colorado, and having enjoyed its beauties, I certainly am not against that being a factor to be taken into consideration.

But I thought, so that you gentlemen would have some facts to go by rather than theories which tend to come out of beautification experts, I would like to show to you here, first a sample of the retorter ash as it comes out of our retort, what it looks like some 7 years later, and I would like to show you this photograph in color, untouched I promise you, of the ash deposit area where you will see green grass growing through. Unfortunately, I have no cow enjoying itself in this picture, but I can assure you it is edible. Also, these pictures were taken in 1965.

Here are three just taken there in the last 60 days which show the same area, and I think it will be comforting to you to know that industry is just as concerned as any of you about what this area will look like when a retort plant has passed through and 20 years have gone by and it has left. We do not propose to have an Appalachian dump heap. We propose to return the area to something which certainly will be in keeping with the beauties of the Colorado mountain scene. May I bring this to you?

The CHAIRMAN. Yes.

Mr. HARTEY. That is the oil shale ash as produced under the effects of moisture, climate, and sodium, deteriorates in the soil, and a little light ammonia, because the nitrogen compounds that are contained in the oil shale and ammonia production is actually made as a byproduct of the process.

As you see, this is a flatland here. These are more recent pictures. We would be pleased to leave that as an exhibit with your committee.

The CHAIRMAN. Fine. Thank you, Mr. Hartley. We will certainly include this in the files in connection with the hearing. Does that complete your statement?

Mr. HARTLEY. Well, I had one other exhibit which I sort of hesitate to show you, but perhaps it does illustrate the entrepreneurial spirit of

Colorado. Oil shale has already gone commercial. This is from an entrepreneur up there who makes cuff links. And so we are not going to be the first with our commercial shale plant, and I trust that he has made a small contribution by paying income taxes on the profit he made from their manufacture.

I want to assure you if you gentlemen will give consideration, and implement the recommendation that I have made, I think in a reasonable period to time we are going to have a torrent of money coming to Washington and to the State capitals.

The CHAIRMAN. Thank you, Mr. Hartley, for your statement. We appreciate having your judgment on this matter.

How far away do you think we are from the development of a commercial product? Your company has been involved in shale oil development for many years, and it is obvious that you have been engaged in research over a period of time, and you, yourself, have substantial personal knowledge of the oil shale problem. How do you see the state of the art at this point in time?

Mr. HARTLEY. We stopped our project in 1958 in terms of spending money at the rates of \$2 to \$4 million a year, because of the two points I made in my presentation: first, if you recall, the 1958 oil imports were coming into this country with no regulations whatsoever, and we were then going to be faced with the problem of making oil shale, pipelining it to our refineries in Los Angeles and San Francisco, and competing with offshore foreign oil, which, as you know, is produced with benefit of depletion.

So we had then to face the issue of, could we compete with foreign oil, with the environment that we were then faced with? We have a depletion law on oil shale at the present time which is 15 percent, but it is based on the rock, and that rock, as you gentlemen know, there is an awful lot of it out there, and it is not worth very much per se until it is retorted and made in the form of crude shale oil.

The U.S. Treasury could simply change the language, and we have requested on many occasions that they change said language to 15 percent on first product from retorting, which is crude shale oil. It is about a 20-gravity crude, incidentally, in most cases from most retorts, and there is a parallel to that. It is the same thing that applies to the retorting of the production of mercury, the depletion. We have not been able to get that through in any way, shape or form.

That, tied to the present import policies, make the venture, since it is such a large single, sudden, adventure—bold adventure, unrealistic. I can assure you if we had been given some of the same kind of assurance, that were given to Puerto Rico, and companies investing there, so that they would have open markets for foreign gasoline production, for production based on foreign crude oil exclusively, and of the U.S. domestic market, assurances of that kind, put in contractual form, perhaps it would cause a lot of things to happen.

In other words, we have got to have some confidence restored in the environment in which the shale oil industry is going to be born. We neither have it in our present oil import administration, nor do we have it in the present tax regulations. So that, in effect, it is the prime deterrent at the present time, in my opinion.

The CHAIRMAN. How far away do you consider commercial development assuming that a program gets underway here whereby commercial operations can commence?

Mr. HARTLEY. There is no point in having this program if we are not going to provide these other two environments I have spoken of. You are just carrying on research in a vacuum, and although we are continuing to do so, it is at a much reduced pace.

We are trying to encourage others who seem to want to spend money at this point, regardless of the fact that there is this vacuum and, I suppose, because we have an ever-abiding faith in this Congress of the United States to eventually provide an environment which will be equitable for the entrance of shale oil into the domestic market.

The CHAIRMAN. Senator Allott.

Senator ALLOTT. First of all, Mr. Hartley, I want to say to you, I appreciate your fine statement. It emphasizes many of the points I feel are very important at this stage, and I would just like to explore one or two things with you.

I had the pleasure—I do not think you were present when I was there—of visiting your plant when it was in operation, and saw it in operation. I was very impressed by the innovations there, and I was also impressed by the reverse process which you had developed—at least reverse as opposed to the process which had been worked upon by the Bureau of Mines.

You mentioned the Athabasca sands in connection with your refinery in Chicago. Would you think that, perhaps, with respect to oil shale, we are now at a point of decision as to whether or not we will engage or start a viable oil shale industry, or whether we might, in light of some of the conditions you mentioned, plus others such as patents and lease policies, and so forth, be faced with an alternative of the development of oil products from coal as well as Athabasca tar sands?

Mr. HARTLEY. Well, Senator Allott, I rarely make bets when I lose one. If anybody had asked me 10 years ago, that synthetic crude oil from tar sands would have gone on the market commercially ahead of oil shale—I took that bet and I lost.

In terms of market, in terms of location of Colorado, and the U.S. consuming areas of consumption, in terms of the longtime proven technology that our company has, for one, and I do not want to give the impression that we have the only viable technology—there could be others around at the present time—I felt that, I had great confidence that, the oil shale industry would have been here by now, and again I repeat the only reason it has not is because we have not provided, either by action of Congress or by the executive branch of Government, the environment conducive to that industry getting underway.

I think it is a great credit to the leadership in the Alberta government that they have seen fit to create that environment in spite of the fact they are drowning from oil made from conventional means. The oil wells of Alberta are turning out approximately 50 percent of their engineering allowances, and yet they have provided the opportunity for the development of this industry along with the development of their conventional crude oil.

Further, as to your comment, I would not be surprised if we keep on treating oil shale the way we have in the past, that coal may even win out, too, because you are aware of the fact that there is depletion on coal.

Senator ALLOTT. I know you are aware of the fact that for the past several Congresses I have had bills pending to do exactly the same thing that you have suggested with respect to depletion allowances, and that is moving the point of depletion—it only requires a change of a few words—over from the extraction of the shale itself to the point of retort, and I think this is one of the necessary things.

There has been a considerable amount of discussion here throughout the day with respect to the Government's wanting to have all the patents go into the public domain and, of course, having spent the money that your company has and that other companies have spent, and particularly your company in this instance, on developing processes, I assume from what you say, this would be a bar to your moving forward in the oil shale industry.

Mr. HARTLEY. Yes; definitely.

May I tell you a story of actual facts? When we started our oil shale program in 1955, we either had to develop our own mine and enter into all the costs of doing that, or we had what I thought was a very fine alternative; namely, that we could buy the shale rock that was coming out of the mine operated at that time by the Department of the Interior, and we were willing to pay whatever the Department of Interior was spending to end up with that mined rock, and that turned out to be, as I recall, somewhere between \$4 and \$5 a ton.

That money would have gone, of course, into the Treasury of the United States and reduced the cost to the taxpayers of the Bureau's program.

We tried every possible avenue to get our hands on that rock, and we had one legal expert after another in practically all branches of the Government make sure that we didn't get our hands on it.

One of the aspects of that was, of course, if we used that rock we would have to turn over our developments to the U.S. Government, so they merely continued to take the dump truck, run it to the end of the mountain up there at Rifle, push a button, push the hoist up and put \$5 a ton over the mountain down on the other side. It ended up in dust at the bottom, I guess.

So that, perhaps, tells you how; that illustrates to you some of the problems we have had in trying to get realistic Government-industry partnership in this problem.

So, naturally, we went ahead and opened our own mine. Why? Because we felt if we spent the kind of money that we had in mind, which turned out to be around \$10 million, certainly we were entitled to have patent protection, and on that subject, there seems to be a tremendous amount of misconception.

I notice one organization after another in the United States, including the committee which met here in Washington not too long ago, where they seemed to associate the patent system with monopoly. The patent system, yes, on paper, I suppose, could be said to be monopolistic, but basically it is a system to give a man a chance to handle his property rights and not have them taken away from him with no repayment for the investment he has made in achieving same.

I can assure you that in the oil industry today I do not think I know of any development in the oil refining and the oil exploration business where the developments of the industry are not made available to other

members of the industry through licensing, and I also hasten to add that those licenses are at modest rates.

Why? Because you never know when you are going to have to take a license from the other fellow. This is the discipline that causes this type of exchange to occur.

I can assure you that we have made our information available under agreement with several companies in the United States. We are prepared to license our inventions, and any additional inventions we make we will be prepared to license those.

As a matter of fact, we licensed and provided the basic information for the refining of tar sands up in Alberta, and that plant up there is running under technology developed to a great extent, as far as the hydrogenation process is concerned, by the Union Oil Co. of California.

Senator ALLOTT. I have just one further question with respect to this royalty. You mentioned that Battelle now had a research project going on, for which you are supplying the oil shale. Are you charging them any royalty?

Mr. HARTLEY. No. They have a retort worth testing in the field, and they need a supply of oil shale. They need a site close to a supply of oil shale in order to continue to carry out these tests.

They approached us as to whether our oil shale experimental site was available. We said it certainly was, they were responsible people, and under the proper terms and conditions, we are leasing our site to them at a nominal sum of \$1,000 a month. That includes the laboratory we built, office buildings, and so on, and also it is quite a lot of nice, level land which, in that area, is a little hard to find; and they will also pay taxes on any investment they make there that requires an increase in taxes on that site.

They have a 2-year period to operate on. We will not have access to their patents. We will get nothing out of this in their first phase other than in the event we ever proceed with commercialization of their retort in the future we will get nominal royalty credit for the services that we are supplying them with.

Senator ALLOTT. But you do not participate in their patents in any way.

Mr. HARTLEY. That is correct, sir.

We are also making available to them free of charge—they are going to have to pay the cost of mining, but free of charge, as far as we are concerned—giving them access to our mountain road, and access to our oil shale mine, and they can take up to 300,000 tons out without accounting to the Union Oil Co.

Senator ALLOTT. Thank you very much, sir.

Mr. HARTLEY. Incidentally, we wish them a lot of luck.

Senator MOSS (presiding). Senator Hansen.

Senator HANSEN. I do not have any questions, Mr. Hartley. I would like to compliment you on an excellent statement.

I must say that it is refreshing to hear a presentation, and yours has been the second one this afternoon, that I think gets down to realities in discussing the facts and the road blocks that are ahead of you and other companies as you contemplate the conversion of oil shale into a usable source of energy that people will have at their disposal, and I think you have done a good job in pointing out what the

real problem is and what the real concern of Government should be in contemplating the regulations that will have to be devised in order to set forth the guidelines and the rules under which this resource will be developed.

I commend you for doing an excellent job.

Mr. HARTLEY. Thank you very much, Senator Hansen.

I might make one additional remark in regard to what you have stated. I sort of get the feeling that there is some feeling that someone is trying to steal from somebody. This leaves me at a great loss, this question of royalty to be paid.

I do not notice, I have not noticed any disappearance of the Federal income tax. In fact, we are looking forward, shall we say, to an increase in the near future on corporate income taxes; although they have not asked my opinion on that subject, I am in favor of that as long as we ask the men to die in Vietnam. We ought to do something about keeping our country on a little more even keel.

But if we are successful in Colorado with a commercial retort, and if it makes money within the framework of the royalty rate provided and the earnings provided in relation to that royalty rate, we expect to pay anywhere from 50 to 60 percent or 65 percent taxes—55 percent income tax to Uncle Sam.

May I hasten to add, even overseas we do not get involved to any greater extent than that, so I am at a complete loss as to the concern that someone might make some money, because if we do make some money the employees of the companies involved are going to participate in salaries, those who put their money in, in terms of investment are going to participate—I presume we still believe in the investment system in this country—and I cannot see what this great fear is, unless there is a sinister move on to eliminate the profit system by every devious device that certain areas of Washington seem to be able to dream up in great volume.

Senator HANSEN. I just might say that I think I quote you when you say we are looking forward to an increased tax; I am not sure that everyone is looking forward to it. We may anticipate it. But I do not think we all look forward to it, and I am sure you do not.

Mr. HARTLEY. It is an expression you use. There is a lady in the room and, perhaps, I had better not use it.

Senator HANSEN. The same thought.

Senator Moss. Thank you, Mr. Hartley, and Mr. Stream, for your very fine statement here, and we are pleased that you came to make this record for us. Thank you very much.

Mr. HARTLEY. Thank you for giving us the opportunity. It has been a pleasure to talk to gentlemen here who are so attentive, and I appreciate it very much.

Senator Moss. Thank you.

We have a problem now. We are not going to be able to hear all of the witnesses who are listed for today. Unfortunately, time has run on and other commitments are pressing in on us.

We did, however, agree that we would hear Mr. Daniel F. Lynch, who is a member of the board of regents of the University of Colorado. He has to leave and attend a meeting of the board in Colorado tomorrow, so we have agreed that we will hear him today.

Our other witnesses, we are going to have to carry over until tomorrow morning when the hearings will continue.

The scheduled time is 10 o'clock. I wonder whether we ought to start a little earlier. Do you think we should? We will start at 9:30. We will get at least a 30-minute start in the morning, and see if we can cover the remainder of the witnesses tomorrow.

We regret the inconvenience that may have been caused to those who expected to testify today, but they cannot be reached. We are pleased to have Mr. Lynch, and we will start again at 9:30 in the morning, after Mr. Lynch has completed his testimony today.

STATEMENT OF DANIEL F. LYNCH, ATTORNEY, DENVER, COLO.

Mr. LYNCH. Senator Moss and members of the committee, I thank you very much for your courtesy extended to me, not only in hearing what I have to say this afternoon, but also in calling me out of order.

I certainly hope that I have not inconvenienced unduly the witnesses who were scheduled to appear before me. It is true, however, that I do have to attend a meeting of the University of Colorado regents tomorrow afternoon or tomorrow morning, so, as I say, I deeply appreciate the courtesy which is being extended to me.

Because I know that the committee has carried these hearings on late into the day, and because I also know that other concerns are certainly pressing on the committee and members of the committee, I shall not read verbatim the remarks which I have prepared and which I have already distributed to the committee.

I assume the members have those remarks and they will be a part of the record, and it will not be necessary for me to make all the points which I made in my prepared testimony.

Senator Moss. We appreciate your doing that, Mr. Lynch. Your remarks will appear in full in the record at the end of your oral comments and you may summarize as you see fit, and make the points that you wish to make particularly emphatic in your statement.

Mr. LYNCH. Thank you, sir.

The primary point that I wish to make at the outset concerns the claims which were filed largely in the year 1966.

The Secretary of the Interior, in his testimony this morning, has referred to these, and various witnesses who have appeared since that time have referred to the problems which have been created by these claims.

I think a few things concerning these claims should be noted. The first thing, which was a little unclear in the Secretary's testimony this morning, is that it is quite clear from an examination of the county records in the counties in which the oil shale deposits, at least in Colorado, are primarily concentrated, in Garfield and Rio Blanco Counties, and that these claims filed in 1966 virtually blanket the entire Piceance Basin or at least those portions of the Piceance Basin which have not previously been patented or on which there were not existing pre-1920 claims. Indeed, there is a considerable overlap between the 1920 claims and the claims filed during the year 1966.

In his testimony this morning, the Secretary indicated that he had recommended that the chairman of this committee introduce legisla-

tion which would require a Federal filing or a Federal notice of recordation of mining claims.

I would think that that would be certainly a helpful step forward. It is true that under the present laws which have existed pretty much intact since 1872 that no such notice to the Federal Government directly has been required.

But the fact is, however, that the Federal Government, the Department of the Interior, at least, was quite aware that these claims were being filed at a time sufficiently early in the filing so that by the issuance of a withdrawal order the Department could have prevented the blanketing of the area and could have prevented the legal situation which the Secretary now advises us he finds himself in. I do not know why the Secretary failed to issue the withdrawal order until January 27, 1967. I do know that he was urged to do so as early as March of 1966.

I earlier observed that former Senator Paul Douglas, who has been present throughout the hearings, had previously discussed these claims with the chairman of the Interior Committee. I know that Senator Douglas has a complete list of all the filings in Rio Blanco County from the preemption index which have been by the most active claimant or locator of these minerals, or alleged locator of these minerals, one Mr. Merle I. Zweifel of Shawnee, Okla.

An examination of that preemption index and of the claims which are filed on record indicates that the first claim in Rio Blanco County by Mr. Zweifel, who has, I am told, something like 97 percent of the new claims in Rio Blanco County, was filed on May 6, 1966.

I think it can be fairly said that, had the Department done what ultimately it did do, what ultimately it found to be wise and prudent and necessary—that is, issue a withdrawal order—had it done that in more timely fashion, we would not now be in the situation where it is necessary to indulge in a considerable amount of legal activity as to precedents to clearing the title of the land, so that the Secretary's leasing proposals can be carried forward. As I say, I have no notion why the Department of the Interior failed to act in more timely fashion.

I do not insinuate, nor do I wish to have my statement interpreted as implying that the Department's failure to act was occasioned by any improper purpose. I have been disturbed as the matter of oil shale development has been discussed by what Senator Allott referred to as the Teapot Dome syndrome.

To me, the great distinguished feature between the Teapot Dome as a historical incident, and the development of oil shale is that so far as I am aware there is no evidence at any stage in the oil shale controversy that any public officials have been venal or corrupt. That was, of course, the thing that made Teapot Dome such a shocking thing.

What concerns me is not any allegations of corruption; it is the fact that the procedures of the Department of the Interior, have not only, under Secretary Udall—I do not make this a personal attack on him—but I should say that to some degree under Secretary Udall, but to some degree under his three most recent predecessors, have been insufficient for whatever reason, to protect the public interest.

I cited two cases, with which I am acquainted—I think there are probably others I could not document. I have reason to believe that

procedures were not sufficient to guard the public interest, of incidents in which the Government of United States issued patents on land where the same lands had been the subject of patent applications in previous years, and where the patents had been previously denied upon grounds other than the failure to perform required annual assessment work.

I listened to the president of the Union Oil Co.'s testimony showing the concern that some people have that somebody may make a profit. I am not at all concerned that oil companies or other investors in the development of the art, in the technology of oil shale production, should, because of their investment, make a profit. Indeed, I hope they do, because without such a profit there will be no development of any oil shale industry in Colorado and in Wyoming and Utah; and in common, I think, with virtually all our citizens in those States, we look forward to such development. We want prompt and effective efforts taken to increase that probability of such development.

What we do not want, however, are these kinds of windfall profits the Secretary has listed—the Secretary has listed these windfalls profits—or the prevention of the windfall profits, as one of the purposes of the proposed regulations. I would say that the two cases that I referred to indicate that windfall profits have been taken in the past.

In my prepared statement, I have indicated that I do not bring these cases to the attention of the committee for the purpose of fixing blame in any way on any particular administration or any particular Secretary of the Interior. But again, to illustrate my concern that the Department of the Interior in the past has not had procedures which were sufficient at all times to guard the public interest, I have cited these cases.

In the one case to which I referred, the *Eaton* case, which was the subject of litigation, now no longer before the courts, the patent originally was applied for in, I believe, something like 1928. The application was denied by the Department of the Interior upon the ground of fraud in the location. It was alleged that some of the locators were dummy locators, and that, therefore, the patent application ought not to be granted, and the patent ought not to issue.

In something like 1948, the lands, still in the hands of the same applicant, were again submitted to the Department of the Interior, and patents were applied for. At that time patents were issued to the same applicants, and apparently there was an ignorance on the part of those in the Department who passed upon the second application that the same lands had previously been denied patents.

Now, this error was discovered in the Department of the Interior and steps were taken by the Federal Government, timely, to recover the windfall profits which were made. Because of whatever legal difficulties which may have existed, the Government settled for, in effect, a good deal less money than the particular person in question made out of his investment in these lands.

The second case I discovered, really, by poring through the records in Garfield County. This involved the issuance of a patent to a person, or actually to an oil company, where, as to some 500,000 acres of the total acreage involved, the patent applications had been previously denied upon, in some cases, the claim that some of the lands were

nonmineral in character, and upon the further ground that the claims were not valid as of the date of the passage of the Mineral Leasing Act, and yet, notwithstanding this fact, the Department of the Interior many years later issued patents to these lands.

I was concerned, especially in this case, by the fact that person who sold these lands to an oil company, the General Petroleum Corp., of Delaware, was able to sell some 5,000 acres of unpatented land for a considerable sum of money, and apparently the General Petroleum Corp. was sufficiently confident of the ultimate acquisition of the title that they paid a considerable amount of money for these claims. For the 24,000 acres, this patent applicant paid the Government of the United States some \$61,500—\$2.50 an acre—under the Mineral Leasing Act. These same lands were sold, actually an undivided interest in the same lands was sold, for a sum in excess of \$1.5 million.

If someone is entitled to a patent under the Mineral Leasing Act and is entitled to acquire the fee title to the land at \$2.50 an acre and thereafter makes a profit, then that is something lawfully, properly, and reasonably done. But if there is any suggestion that the title to the patent ought not to have been released by the Government, then this is certainly an instance of a windfall profit which the Department ought to protect the public against.

Senator Moss. May I interrupt you for just a moment?

Mr. LYNCH. Yes, sir.

Senator Moss. Are you talking about the Mineral Leasing Act or the mining law? I do not believe you can get a patent—

Mr. LYNCH. If I said that, then it was said in error. I am talking under the mining law of 1872. You can get a patent under the mining law; you cannot get a patent under the Mineral Leasing Act. That is correct.

So the first point I want to make, and this is about all that I would say as to this point, is that I think there ought to be a review of the procedures that are followed in the Department of the Interior in dealing with these valuable public resources.

In the hearings of March 12, I think it was, or May 12, 1965, Under Secretary Carver clearly brought the power into focus, the tremendous power of the Department when he indicated that in a single lease of 5,120 acres you could have up to 18 billion barrels of oil equivalent.

So the point that I am making is that, before the Department is entrusted, as really it is already, I think, by law, but since Secretary Udall is asking the guidance of the committee, I think the committee should recommend or request that there be a review of the procedures in the Department for dealing with these lands to prevent the kind of things that have happened in the past, and also to assure that all decisions which are made are made in the public interest.

Now, in saying this, again I am not trying to cast aspersions on anybody's honesty and integrity, but certainly the procedures have left much to be desired.

Specifically, I think someone should inquire of the Secretary why it was that, even though the Department was well-advised of this great spate of claims, no withdrawal orders were issued until after all the land, essentially all of the valuable land, in the center, the heart, of the Piceance Basin had been claimed.

I have never heard any reason offered by the Department for the delay, and inasmuch as the Secretary himself cites these claims as an impediment to progress, I cannot help but wonder how it was that the Department, knowing that the situation existed, failed to act until the problem had become a serious one.

Senator Moss. What was the date of the withdrawal order?

Mr. LYNCH. January 27, 1967. And I say in my statement that this Mr. Sweifel alone, between 1966 and the date of the withdrawal order, filed claims covering some 340,000 acres in Garfield County. That is an approximate figure, simply counting the entries in the preemption book and multiplying by 160. But so far as I know from inspection, all of the claims filed by Mr. Sweifel were 160-acre claims.

The second point that I make, and this is in the form of a suggestion to the committee, is that the Department of the Interior must immediately begin to contest these claims or some other device must be found by which the claims can promptly be declared null and void, if indeed they are, and the Secretary indicated, I suppose, in his statement this morning, there may be doubt as to the validity of some of them. Perhaps, some of them are valid, but, at any rate, some disposition of this matter ought to be taken promptly, and unless action is taken promptly we may have the same problems we have had with the pre-1920 claims where witnesses have disappeared, people have died, testimony has become unavailable, and the like.

I have suggested an approach to the committee which it may find helpful, and that is a legislative taking of these lands. Of course, the Constitution provides that we cannot take property without the payment of just compensation, but I am advised there are some precedents for either executive or legislative taking without condemnation proceedings, where provision is made for the filing of claims so that just compensation can be made. If this technique were available it would have a considerable number of advantages over the institution of contested proceedings which are necessarily lengthy.

Primarily, the title question, the question of whether these lands will be made available for leasing or whatever other disposition that the Secretary or the Congress proposes to make, the title question would be solved immediately, and the other question to be then determined is, What is the fair value, if any, of the claims which have been filed?

I leave it to the committee to consider the merits of this, if it has any merits. At any rate, it is a matter that has to be looked into.

I would like to make a few other points. There has been testimony, of course, by representatives of oil companies, and I have no doubt that the oil companies who have been interested in the Piceance Basin area of Colorado and other areas where oil shale deposits are known to exist, would like to have a right to keep the process of extracting the kerogen from the shale stone. I have no doubt, if the process were developed and were sufficiently economically attractive, that we would develop an oil shale industry.

I am concerned, however, that the Secretary, apparently, and the committee, at least in these current hearings and in other hearings which have gone before this, have not considered as an alternative to the leasing proposals or the inducement method of encouraging private

development that there might be some advantages in proceeding on a parallel system of Federal investment or public, or quasi-public investment, which would at least supplement the efforts which are made by the private companies.

Apparently, there is uniformity only on this point as to one thing; that if we are going to use nuclear explosives the Government will be permitted to supply the atom bomb. But I think that the basic research and the basic technology of oil shale development really dates back to the research efforts of the Bureau of Mines in Rifle, Colo., in which the Federal Government had invested some \$15 million. I think that, particularly in relation to the conservation goals, some Federal participation in the investigation of these resources and in the refinements of the technology should be encouraged.

I have no doubt that the president of Union Oil Co. and other executives of other oil companies are sincere in saying to you they do not want to see pollution and the despoliation of the natural resources of the area. There is, nevertheless, a natural difference between the interest of a private company whose primary concern must be a fair return to the shareholders, and the people of the United States, who have to think in broader terms of the preservation of the environment.

We have learned in some ways in recent years that the ecology of an area can be upset by even very slight things, and certainly, if the retorting and development of the oil shale resources are going to be undertaken primarily as suggested by the president of the Humble Oil Co., by the refinements and the methods developed originally by the Bureau of Mines, and refined further by Humble and the group at Anvil Points, then, notwithstanding what other pictures you have seen, there is going to have to be a great deal of intelligent work and hard thinking and a great deal of investing in techniques to prevent the despoliation of the country.

The fact is that the slag, which is a byproduct or the end product, in a sense, of the retorting effort, cannot be redeposited in the holes from which it is taken, and if an oil shale industry of any magnitude is developed, there is going to be a tremendous quantity of this waste product which is going to have to be somehow dealt with. I think in this area, particularly, some direct Federal participation or some indirect Federal participation, perhaps in a quasi-public corporation, would be highly desirable. I believe, certainly, at least, that this committee ought to consider the advisability of that approach as compared with the one suggested to you by the Secretary.

The last point that I would like to make is this: While I agree with what Senator Hansen said, that the sole consideration in the development of oil shale resources is not the amount of royalty moneys that is received by the Federal Government, as a citizen of Colorado, a State which, if an oil industry is developed, I could look forward to the possibility that an oil shale industry would increase the tax base in the community and provide employment for a great many people, and many other subsidiary benefits could be envisioned.

Given that fact as true, however, I think that it is also true that we must consider the matter of the fairness of the return to the people, compared to the fairness of the return to the company. One of the things that concerns me and one of the things that concerned Mr.

Cohen, who is a member of the Secretary's advisory group, in the consideration of oil shale, one of the things that concerned Kenneth Galbraith and concerned Dr. Morris Garnsey, who appeared before the Antitrust and Monopoly Committee of the Committee on the Judiciary, is the possibility that the oil industry may, having gotten all the inducements that we can offer, not develop the oil shale resource as we hope it would be developed.

I am not an economist and I am not prepared to submit evidence to the committee which is the intelligent way to make that judgment. I do suggest, however, that this is an endeavor which has been made by knowledgeable people whose opinions are respected, and whose accomplishments are known, and before we make this approach, which precludes any alternative in this industry to encourage oil shale development, we ought to consider at least the possibility that the oil companies may not be presently disposed to make the kind of investments that a technology in successful oil shale exploitation requires.

Senator Hart has indicated, and I think properly, that in the development of a brandnew industry, as it were, it would be helpful if other corporate financial entities not presently engaged in the production of liquid petroleum would put their oar in the oil shale field as a means of encouraging competition, and the like. I think this monopoly aspect ought to be considered by this committee as well as by the Antitrust and Monopoly Committee, because, while the work of the Antitrust and Monopoly Committee runs, in a sense, legitimately in this field, it is certainly in this committee and in the House Interior Committee that the basic legislative decisions are going to be made which will affect, for good or ill, the future of oil shale development in this country.

I thank you again, Senator Moss, and I thank Senator Jackson for the courtesy that he has shown in permitting me to testify today, and I thank the members of the committee for this opportunity to appear.

Senator Moss. Thank you, Mr. Lynch.

We are very glad to have you come and point in a little different direction from where the testimony had led us earlier, pointing to areas where, certainly, careful scrutiny must be exhibited and the matters must be considered by this committee.

Senator Allott, do you have any questions or comments?

Senator ALLOTT. Yes, I have one or two questions and comments, Mr. Chairman.

First of all, Mr. Lynch, I want to make it clear that you appeared here as a private individual.

Mr. LYNCH. That is true; yes, sir. I have been interested as a public official in what happens to the resource, but I do not appear in any sense as a representative of the university, nor express the opinion of the board of regents or any other members thereof.

Senator ALLOTT. Or of the department of natural resources of the State.

Mr. LYNCH. That is true.

Senator ALLOTT. Nor of the Governor.

Mr. LYNCH. That is quite true.

Senator ALLOTT. I must say that I am quite in sympathy with your feeling about the dreadful situation that we have gotten into, not

only on the claims that you have mentioned and referred to specifically, but also upon the fact that we have made no progress, or substantially no progress, in the area of cleaning up all of the old claims under the laws prior to the Mineral Leasing Act of 1920.

I just want to ask one thing about this matter of the Sweifel claims. You mentioned these. It is my understanding that the limitation on a claim is this situation, that of 20 acres per person. However, you can associate eight persons together for the purpose of making one claim as large as 120 acres in a placer situation.

Mr. LYNCH. I think it is 160 acres, sir.

Senator ALLOTT. Did I say 120?

Mr. LYNCH. Yes, sir.

Senator ALLOTT. 160 acres.

Did you run across the association of himself with others in this?

Mr. LYNCH. Yes, sir. Each claim had eight locators.

Senator ALLOTT. To apparently legitimize the filings which he made.

Mr. LYNCH. Well now, I do not assert that all these filings are illegitimate. I am not competent to do that.

I will say this: An examination of the record indicates that, for example, on some days there would be 60 claims filed, on some days 100. It is inconceivable to me that you can locate and stake, and so forth, all those claims.

Senator ALLOTT. Will you let me state my question over again. I have not seen these records, and I frankly did not know until today the extent of his filings. I just heard the name, that he had made some filings, and that is all.

Did he associate others with him?

Mr. LYNCH. Yes. In almost all of them.

Senator ALLOTT. So that there is an apparent legality.

Mr. LYNCH. Yes, that is correct. There are eight names on each claim and, of course, you only need one person to locate if the other persons are willing to cooperate in development of the claim.

Senator ALLOTT. Now, in your prepared statement, you say:

For this reason, I suggest this committee request that the Secretary refer the proposed leases to the committee for review before any binding decisions are made.

Mr. LYNCH. Yes, sir.

Senator ALLOTT. We have several areas today where we are in very deep quarrel with the executive branch which alleges that this is an incursion into the executive prerogatives. This is true in the "Water-sheds Act" and in some other places. While we recognize the problem, I think if this committee took this course of action in this instance we would find ourselves in a stalemate with the executive branch.

Mr. LYNCH. Well, I assume Secretary Udall probably, as I understand the situation, could go ahead and make these issuances of leases without any legislation at any rate. He sought out the advice of Congress and said quite explicitly this morning that he wants to make these decisions in the white heat of publicity. I was only hoping that the Congress might oblige.

Senator ALLOTT. You would not think, for example, that there were people in the room this morning who had made application for and

received exploration leases for minerals other than oil in this area which were given by Secretary Udall 2 or 3 years ago—something like that. Do you think that we should take steps to cancel out these people's valid leases—these people who subsequently, because of rulings of the Secretary, or lack of ruling by the Secretary, or overfiled under the mining law on the exploration leases they had? Do you think these people should be deprived of their effort and their enterprise in this respect?

Mr. LYNCH. You are talking about leases, for example, for liquid oil and gas that exist in the area, sodium?

Senator ALLOTT. No. I am talking about mineral leases.

Mr. LYNCH. I am talking about the claims under the mining laws of 1872, not leases.

Senator ALLOTT. Yes. They were prospecting permits, is what they were.

Mr. LYNCH. You are talking about the sodium prospecting permits?

Senator ALLOTT. Yes, dawsonite and nahcolite.

Mr. LYNCH. It is not what I had in mind. I had in mind the claims filed in 1966 by Mr. Sweifel and others. You are saying that there are other overlapping claims or lease applications, or what are they?

Senator ALLOTT. There were prospecting permits issued—

Mr. LYNCH. Yes, sir.

Senator ALLOTT (continuing). By the Secretary which, as far as I know were legitimate in every respect, and because of decisions and half decisions, and lack of decisions, by the Secretary, I think perhaps as late 1966, some of these people filed mining claims on the very areas, the very lands on which they already had prospecting permits for.

You do not think that these people should be deprived of their enterprise and the money they spend for the purpose of going about this business of acquiring other minerals, do you?

Mr. LYNCH. No. I am not trying to deprive anybody of what he is lawfully entitled to and, indeed, in the suggestion I made, anybody would be able to recover what he was lawfully entitled to by way of just compensation.

Senator ALLOTT. You have attended any of the oil shale symposiums in Colorado?

Mr. LYNCH. Yes, sir.

Senator ALLOTT. Were you present approximately 2 years ago when I told the oil shale symposium at the Denver-Hilton that in any event the cost of reforestation and so forth would have to be considered as a part of the cost of operations of an oil shale operation?

Mr. LYNCH. I was not, sir.

Senator ALLOTT. Do you actually know of any company, Mr. Lynch, which is not considering this and studying it in depth, I mean, any company which has evidenced an interest in this area, which is not considering and studying in depth the ways and means by which they can handle the waste situation and return it as near as possible to its natural environment?

Mr. LYNCH. I am not advised of the efforts that the companies are making. I did accompany the former Senator Douglas on a tour on the Western slope this summer. We stopped at the Anvil Points

plant. We were received very courteously by the management and people who were controlling the research and the management thereat, and they indicated to us that they had observed at the site of the pilot plants of the Department of Mines on their holdings, that the, I should say ash piles, if you want to call them that, after about three years appeared to support vegetation.

I specifically asked whether they were doing any research in the conservation area and, as I understood the answer, they were not. Their interest, and the thrust of their research, was in the effort to find various methods to extract the oil from the shale. The gentleman who was the project manager, who was very interesting and courteous but whose name I cannot recall—he worked for the Mobil Co.—one of the members of the group, indicated he believed that the problem could be solved with sufficient planning, but he did not indicate that this was absorbing a particularly great amount of the energy and effort undertaken over there.

Senator ALLOTT. There is no question about this: the purpose of the consortium at the Anvil Points plant is not in this area. The first purpose and primary purpose is to develop a viable method of retorting and extraction which would enable them to compete.

But in talking with these various people all through the years—and it has been years, not just a matter of the last year or two years—I have found them with a complete awareness that this problem has to be solved.

Not all of it, not all of the ash, as you referred to it, can be put back in the ground, because it actually expands. But there is also the possibility that a portion of it can be; and, as the pictures show here, the Union process apparently has supported a very good vegetation after a period of several years there. I hope we can do this.

Mr. LYNCH. I am not trying to accuse anybody of wanting, nor of being unconcerned about these conservation problems, but I think you could probably fairly say that nobody wants to pollute the Potomac. Nobody was mean and vindictive and wanted to poison the fish, but somehow it got polluted, because not enough attention was taken by any responsible agency that had jurisdiction over the whole Potomac River Basin.

Each of the companies, each of the cities, along the banks functioned responsibly in the light of their own responsibility, but the end result was unhappy, and I think we are going to live with it for a long time, until we can clear it up. So I was hoping that some Federal participation at least in this conservation area might prevent that kind of occurrence in the development of oil shale.

Senator ALLOTT. Well, I do not mind that, but I do not think that, except in an advisory way, it is necessary because the Secretary has full powers, under the present situation, before he grants a single lease to require as a condition precedent that this situation will be taken care of, and under such terms as he directs and that the parties agree on. I simply cannot conceive of this particular Secretary, who is so concerned with beauty, not doing this.

Mr. LYNCH. I certainly hope you are right. I hope that all the succeeding Secretaries are equally concerned.

Senator ALLOTT. That is all I have, Mr. Chairman.

Senator Moss. Senator Hansen.

Senator HANSEN. I would like to thank you for your statement, Mr. Lynch, and to say that I share your interest in higher education. I was a member of the board of trustees of the University of Wyoming for some 17 years before I was elected Governor, and I know how deeply you feel about the needs and the requirements of higher education.

I think this demonstrates how we can have common concerns, and perhaps look at problems slightly differently. I do not mean to imply that we have any great rift in our interests, because I share yours in the desirability of keeping undespoiled, insofar as we possibly can, the area of the country in which these oil shales are situated.

I share, too, your interest in being concerned with the problems of air and water pollution. These are very serious problems.

I think, perhaps, if there is any basic difference in our philosophies, it is the contribution that I think a viable profitable industry can make and can add to a good educational program, as contrasted with what would result if that industry should not come into being.

Perhaps, I am only guessing on this, you may view the problem slightly differently there, but I think our concern is to be certain that Government gives adequate encouragement and adequate recognition to the problems of the industry, so as to assure that it will become involved in this instead of in the tar sands in Canada, or some other place where an investment could be made that conceivably could be more profitable.

You have made a good statement. Thank you, sir.

Mr. LYNCH. Thank you, sir.

Senator Moss. Thank you, Mr. Lynch, for your contribution to the record. We appreciate your pointing out to us some of the serious problems that remain to be clarified in this area with regard to mineral locations and prospecting permits. Certainly, these must be clarified and titles established; otherwise, we cannot go ahead and expect a development in this oil shale area. We appreciate your testimony and your prepared statement will be printed in full at this point.
(The statement referred to follows:)

STATEMENT OF DANIEL F. LYNCH, REGENT OF THE UNIVERSITY OF COLORADO

Mr. Chairman, members of the Committee, it is a pleasure for me to appear before you to express my views concerning the leasing proposals relating to oil shale lands which have been promulgated by the Secretary of the Interior, the Hon. Stewart L. Udall. It is particularly a pleasure as I have had the honor to be employed as a legislative assistant by a former member of this Committee, the Hon. John A. Carroll of Colorado.

I appear before you as an interested private citizen who has studied the problems involved in oil shale development. I appear also as an elected public official. I am a member of the Board of Regents of the University of Colorado, whose members are chosen by the people in state-wide elections. While it is true that my responsibilities as Regent do not directly involve the subject of oil shale, it is also true that the ultimate disposition of public lands bearing oil shale within the jurisdiction of the Department of the Interior and the Congress of the United States will profoundly affect the University and all public institutions within the State of Colorado. I need not remind this Committee that under the laws a considerable portion of the revenues derived from royalties under the provisions of the Mineral Leasing Act is reserved to the states from which the mineral resources are extracted. It is, therefore, a matter of considerable interest to me, in both my private and public capacities, what the Congress and the Executive Branch do with the vast reserves of oil shale.

As Senator Allott told this Committee at the time of its hearings on May 12, 1965, "In Colorado alone, the combined resources of oil shale underlying some 1,380 square miles is in excess of one trillion barrels." As Secretary Udall said in the preface to his leasing proposals, "The richest shales are believed to be in the Piceance Creek Basin of Colorado, where some 770,000 acres contain 25-gallon-per-ton shale in thicknesses of 15 feet or more." Indeed, it has been said that in the Piceance Basin there are several sections of land in which the imbedded reserves of oil shale are as thick as 2,000 feet!

Thus, the people of Colorado, together with their neighbors in Utah and Wyoming, where other reserves of known abundance exist, have a unique interest in the development of this resource. While there are many divergent views as to the best way to encourage such development, there is no doubt of one thing, the people in these states want to encourage prompt and effective exploitation of this resource.

At the time of the hearings of May 12, 1965, then Under Secretary John A. Carver told this Committee that a major problem in the formulation of policy concerning oil shale development lay in the adjudication of the validity, or invalidity, of unpatented pre-1920 mining claims. The Chairman of this Committee, the Hon. Henry M. Jackson, advised me by letter received September 11, 1967, that the Committee "cannot hear arguments or views on the validity or invalidity of the oil shale mining claims." "This issue," he said, "properly is before the Courts." I shall, of course, observe this limitation and shall confine my remarks to the matter before the Committee, the probable effect of Secretary Udall's proposed regulations on the development of the oil shale reserves in the publicly owned lands of the United States."

Secretary Udall's proposed leasing regulations were formulated to implement a five point program announced January 27, 1967 which was intended to promote the recovery of oil shale and associated minerals from the Green River Formation. The first point of that program involved action to clear title to public oil shale lands in the area.

This key point was not necessary because of the pre-1920 claims, the ones now before the courts, but because of the filing of literally thousands of claims during the year 1966. On the same day on which the Secretary announced his five point program, he issued an order withdrawing the oil shale lands from further claims. This action had been urged on the Secretary by persons within and without the Department. To my knowledge the withdrawal order had been recommended as early as March, 1966. For whatever reasons, the order was not finally issued until January 27, 1967.

As I am sure the Committee knows, these claims, unlike the pre-1920 claims, are not "oil shale claims". They were apparently based on the presence in the formation of metals and other minerals presumably not covered by the Mineral Leasing Act of 1920.

To gain some idea of the extent of these filings, I accompanied a former distinguished member of the United States Senate, the Hon. Paul H. Douglas, on a fact finding trip to the Western Slope of Colorado. Examination of the records located in the Clerk and Recorder's offices in Garfield and Rio Blanco counties verified what we had been told, that almost every square foot of ground hitherto unclaimed had been claimed in 1966.

Between May 6, 1966 and the date upon which the Secretary issued the withdrawal, one man alone, Mr. Merle I. Zweifel of Shawnee, Oklahoma, filed over 2100 claims covering approximately 340,000 acres in Rio Blanco County!

The intentions of Mr. Zweifel with regard to these claims are not obscure. In an interview with Bert Hanna, *Denver Post* natural resources writer, Zweifel said: "The government, to tie up oil shale, has been trying to defeat the use of mining claims. There are other minerals interspersed with oil shale and I defy them (Interior Department officials) to even lease these lands unless they bring the whole thing into focus."

Mr. Hanna's article, in which this quotation appeared, went on to say: "Secretary Udall, according to reliable reports, will soon declare the claims invalid and it then will be up to Zweifel and associates to establish validity in Court."

I fear it may not be as easy as suggested to declare the claims invalid. Unless patent applications are submitted "to bring the matter into focus", an unlikely possibility, the Secretary would have to initiate contest proceedings which might take years to resolve.

Under the Multiple Mineral Development Act of 1954, mining operations pursuant to rights under any patented or unpatented claims must "be conducted, so far as reasonably practicable, in a manner which will avoid damage to any known deposit of a Leasing Act mineral."

The problem is that there may be no "practicable" manner in which the claimants can do this. Geological evidence appears to indicate that the dawsonite and other minerals which form the basis of these claims is interspersed within the oil shale deposits and that there can be no exploitation of the one without a disturbance of the other. While this fact may prevent the claimants from disturbing the oil shale, it may also prevent the government from granting leases which would disregard the rights of the claimants to the other mineral substances. Mr. Zweifel has clearly put the government on notice that this is his position. Whatever the legal merit of this position, it is another matter which could occupy the Courts for years to come to the detriment of prompt advancement in the development of oil shale technology.

One tempting possibility might eliminate these problems. Responsible applicants for leases under the Secretary's proposed leasing policy could purchase the claims of Mr. Zweifel or other of the 1966 claimants, or they could enter into a cooperative association with such persons in the submission of leasing proposals. The absence of the possibility of legal controversies which would attend such an application might make it more attractive to the Department than alternate proposals which would involve the probability of extensive litigation. Thus, these claims, which the Department apparently feels are largely invalid could form the basis of an unfair advantage in securing a lease. Since one of the announced purposes of the leasing proposals is to prevent speculation and windfall profits, this possibility ought to be prevented by prompt and effective action against the 1966 claims. Even more important, the primary purpose of the regulations is to foster improved oil shale technology, and the inclusion of such extraneous factors as the avoidance of litigation cannot but blur the focus on this primary goal.

Action to eliminate these 1966 claims as clouds upon the title to public lands must be taken now!

It must be taken in order to facilitate the Secretary's leasing proposals, if they are to be issued, but even more important, because a failure to take such action could result in the loss of evidence, the death and departure of witnesses and perhaps, in the ultimate grant of patents to claimants or their ultimate assignees in instances where such issuance is unjustified and could be prevented by prompt action.

The action must be such as will permanently bar the claimants from further consideration.

This Committee is fully aware that in the past apparently final departmental action has proved to be not final at all, and that claims long regarded as defunct have been revived to plague the Department, the Congress and the Courts and to delay the making of necessary decisions regarding the development of oil shale.

If a program is undertaken by the Department to determine the validity of the new claims and to eliminate those which are not valid, it is foreseeable that it will cost a considerable sum. The effort would involve salaries of mining engineers to make field examinations of claims, the cost of assays, the cost of legal review, stenographic costs and the costs of hearing, including salaries of court reporters, hearing examiners and other personnel. If the claimants are adequately financed, the costs will inevitably rise as appeals are taken. Assuming a cost in round figures of \$300 to \$500 per claim, the possible costs of such a program could involve millions of dollars. The cost of service alone would be staggering as compared to almost any other kind of litigation.

And yet, unless something is done, the Secretary's leasing proposals and the whole future of orderly oil shale development may be stalled. If it is true that metalliferous substances forming the basis of the new claims are intermixed with the oil shale deposits, the new claimants, even on unpatented claims, will be in the position to assert that they are full partners in the oil shale deposits with the United States. Pursuant to the Chairman's instructions, I shall not venture an opinion on the validity or invalidity of these claims. Whether valid or not, however, they constitute a cloud until eliminated which may force the Department to delay development or to grant claimants a priority of consideration in leasing arrangements or to force responsible applicants into cooperative arrangements which they would not otherwise enter.

I suggest that there is an alternative to contesting these claims, although if this suggested course is rejected, the claims should be contested vigorously and

at once. I recommend the legislative taking of these lands. That is that the Congress enact legislation divesting the claimants of their claims. I believe this could be constitutionally accomplished if adequate arrangements for the payment of the just value of the claims were made. Certainly it cannot be contended that such a taking is unrelated to a valid public purpose, the orderly development of the oil shale resources of the United States.

Such a legislative taking would have a number of advantages:

It would eliminate the clouds on the title to the lands involved immediately. Even if the litigation as to the validity and value of the claims was thereafter protracted it would not occasion a delay in development.

It would destroy the bargaining position of the claimants who have, at least in Mr. Zweifel's case, plainly stated their intention to produce a stalemate. As already indicated, such a stalemate could give decisive leverage to claimants even if the claims are invalid since their invalidity could be proved only after they have been given their day in court. If the only matter to be litigated is the value of the claim, if any, it is likely that the least promising claims will be abandoned by the claimants rather than incur the costs of litigation.

It would be less expensive than government instituted contest proceedings. Since the destruction of the bargaining position of claimants would discourage prosecution of valueless claims, there would be fewer cases to be decided and proportionately fewer costs to pay.

It would prevent any appreciation in the value of the claims. To contest the claims directly would involve inevitable delays. To take the lands by statute would involve one quick stroke preventing any appreciation in the values involved.

I would suggest that the statute encompass all lands included in Executive Order No. 5327 of April 15, 1930. I would further suggest that the claimants be given six months from the effective date of the act in which to file claims for payment of just compensation. If the claimants have made valid discoveries and if they have complied with the mining laws in establishing their claims, it should not be difficult for them to submit the proof of these facts in that time. The claims might be appropriately filed in the Court of Claims, although it is possible that it has too few personnel and too little experience in such matters. If so, the claimants could present their claims to the Department of the Interior itself which surely has the experience and the personnel to process the claims. Appeals from adverse determinations of the Department could be taken to the Courts as is presently done.

Unless some such action is promptly taken, I fear that the Secretary may not be able to locate 30,000 unclouded acres of public land to lease. Even if this much land is available at present, the choice of sites would be narrowly circumscribed unless remedial action to expunge the 1966 claims is taken.

That such action is necessary because of the inexplicable delay of the Secretary to issue the withdrawal order is beyond dispute. I would hope that this Committee would inquire of the Secretary as to the reason for the delay. Such inquiries are not suggested for the purpose of affixing blame for what appears to be a lamentable lapse of vigilance, but rather to assure the Congress and the American people that the Department's procedures are sufficiently thorough to protect the public interest. I confess to some misgiving with reference to the leasing proposals when I consider the lack of prompt and effective response to the greatest flood of placer mining claims in the history of the nation. Everyone interested in minerals in the areas affected knew of the filing of these 1966 claims while they were yet in progress. The Secretary ultimately confessed the propriety of withdrawal by the issuance of the order. Yet, when finally issued, the withdrawal had the same effect as locking the barn door after the horse was stolen. In his testimony before this Committee on May 12, 1965, Undersecretary Carver properly pointed out:

"... the oil shale leasing sections of the Mineral Leasing Act, section 241 of title 30 of the United States Code, leave enormous discretion to the Secretary of the Interior. He receives, in that act, no help from the Congress on the size of the lease, save that it must be less than 5,120 acres. That much acreage potentially can be staggering in its reserves. . . . Forty acres on some of these beds . . . could run into the billions of barrels . . ." Page 33. At the same hearing Senator Gaylord Nelson asked:

"So under this leasing authority the Secretary in his discretion may lease to one lessee the equivalent of what would amount to 18 billion barrels of oil equivalent from the shale on a 5,120 acre plot?"

Mr. Carver responded:

"If the withdrawal order were to be lifted, and I think the Secretary has authority also to do that." Page 35.

The present leasing proposals being considered by this Committee are promulgated pursuant to that authority. Surely the people and the Congress wish to have confidence in the procedures and personnel of any Department to whom the power is given to dispose of so much of the national treasure of the United States.

The acceptance or rejection of various proposals made pursuant to the proposed regulations will not be a simple matter of opening sealed bids. It will involve many subjects and technical judgments.

It is not my purpose to cast doubt either on the integrity or capacity of the Department or on its ability to make these judgments in the public interest. It is my purpose to suggest that in important matters involving the public interest the department's procedures have not always been sufficiently guarded.

For example, the Department issued patents on a tract involving considerable acreage although the same claims in the hands of the same applicant had been declared null and void on the ground of fraud in the location in earlier proceedings. Although the error was subsequently discovered and suit was brought to recover either title to the lands or restitution of the value thereof, the government recovered only a portion of the profit realized by the applicant. This was the Eaton case which was concluded by settlement in 1957.

My own search of the county records in Garfield and Rio Blanco counties revealed a case in which the Department issued patents on claims which had previously been declared null and void upon grounds other than the erroneous ground of failure to perform assessment work. These lands, together with some others which were previously patented, were sold to a major oil company for an excess of 1.5 million dollars. For the same land the government had received approximately \$61,500. I wish to emphasize that I am not expressing any opinion as to the validity or the invalidity of these claims. Two things about the case concerned me and, I think, properly relate to my concerns about the leasing proposals. One was that as to more than 5,000 of the acres sold, the patents were not issued until after the sale. It would appear that the ultimate purchaser had good grounds to believe that they would be issued. Second, when I examined the file in the General Land Office, I was unable to find any reference to the fact that these claims had been previously denied patents. It is possible that such evidence was contained in the abstract, which had been removed from the file and was not available at the time I checked the records. One other thing should be noted in connection with this case. The sale price of \$1.5 million or more, as above mentioned, was for an undivided one-half interest in the land!

These apparent lapses of procedure cause concern in light of the tremendous significance of departmental decisions involving billions of barrels of the people's oil.

In his testimony on May 12, 1965, Mr. Carver also told the Committee:

"In other words, given what we know about oil shale as a resource transcending all other deposits of hydrocarbons now known on earth, it seems to me that a Secretary would want to keep the Congress closely apprised of everything he did in the field. These resources, after all, belong to all the people of the United States." Page 36

I wholly concur in that statement. I presume it remains the policy of Secretary Udall under whom Mr. Carver served.

For this reason, I suggest this Committee request that the Secretary refer the proposed leases to the Committee for review before any binding decisions are made. Congress and the people should know the facts concerning alternative proposals before commitments are made which would divest us of control of some of our most valuable public lands.

At this time it is difficult to speculate as to the probable effect of the Secretary's proposals. It is apparent from a review of statements made in the press by representatives of oil companies that there is considerable concern about the proposed royalties and, more particularly, about the provisions relating to patent rights. If, as may be the case, the present proposed regulations do not entice major investment in research facilities as envisioned, the Committee should review the whole idea of private leasing as opposed to other approaches such as that envisioned by Dr. Morris Garnsey, a distinguished Professor of Economics at the University of Colorado. Dr. Garnsey, in testimony before the Subcommittee on Anti-Trust and Monopoly of the Judiciary Committee, urged consideration of a public or quasi-

public corporation which could begin immediate and extensive investments in the technology of oil shale development. Such a commitment of public resources would not necessarily envision the permanent domination of the oil shale industry by the government. Indeed, the first stages of the Secretary's leasing proposals envision an experimental rather than a commercial effort. The functions of such a quasi-public corporation could be limited to this phase. Its costs could be recovered from royalties received after commercial production was instituted by private lessees. Such a public oriented entity is ideally suited to undertake one important function of the proposed research, that of protection of the environment. While the Secretary's proposed regulations quite laudably take this important matter into account, it seems to me that a public corporation would be more naturally concerned with, and place greater emphasis upon conservation values than a private concern which is quite properly preoccupied with returning a proper reward to the shareholders. The skies of our cities and the state of our rivers attests to this. Nobody is in favor of air or water pollution, nor does anyone aspire to upset the delicate ecological balance, but experience has proved that people and corporations do these things with little thought of the consequences until critical situations are presented. I am sure that private lessees would be concerned with these matters, particularly inasmuch as the regulations would make such an interest mandatory. For my part, however, the goal of minimizing the possible adverse effects on the environment of large scale retorting operations is a goal of the highest priority. Much as I desire the prompt development of this important resource, I would not suffer such development at the expense of turning northwestern Colorado into an ash pit. A corporation naturally attuned to such a goal may be more effective than a corporation naturally regulations to demonstrate some concern.

If the proposed regulations of the Secretary of the Interior are to be modified before leasing proposals are accepted, the modifications should be brought to the attention of this Committee. If the protective measures which have been made a part of the proposed regulations are substantially weakened to the detriment of the public interest, the Committee should consider not only the proposed regulations as amended, but also alternate proposals such as Dr. Garnsey's.

Another aspect of the Garnsey proposal, as it contrasts with the leasing regulations promulgated by the Secretary, which deserves the Committee's consideration, is his claim that such a quasi-public or public entity would be more likely to insure the speedy advance of the art of oil shale retorting and refinement. Many economists, Dr. Garnsey included, have expressed the concern that private oil companies may not want immediate development of oil shale resources. As a non-economist, I am not qualified to speak to that subject. But it seems the advantages of such an approach as Garnsey suggested, together with thoughtful consideration of the dangers of foot dragging efforts, ought to be considered before the acceptance of regulations which do not appear to make satisfactory progress an essential requirement of a lease.

In summary, I wish to suggest:

- 1) That the first priority in approaching the Secretary's leasing proposals is to clear the titles clouded by the claims filed in 1966;
- 2) The best method of promptly accomplishing this is a legislative taking coupled with fair and adequate provisions concerning payment of just compensation for the claims;
- 3) The procedures and the past practices of the Department of the Interior should be reviewed to ensure the maximum safety and the greatest application of competent deliberation in decisions regarding oil shale matters;
- 4) Any changes in the proposed leasing regulations, and any specific applications, should be reviewed publicly by this Committee before final action is taken.
- 5) If the regulations are substantially modified by the elimination of requirements designed to protect the public interest, the feasibility of alternate methods of insuring oil shale development should be considered together with the final leasing regulations.

I appreciate the opportunity of expressing my views and thank the Committee for having heard me.

Senator Moss. The hearing will now be recessed until 9:30 tomorrow morning.

(Whereupon, at 5:15 p.m., the committee recessed, to reconvene at 9:30 a.m., on Friday, September 15, 1967.)

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FEDERAL OIL SHALE PROGRAM

FRIDAY, SEPTEMBER 15, 1967

U.S. SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The committee met, pursuant to recess, at 9:30 a.m., in room 3110, New Senate Office Building, Senator Frank E. Moss presiding.

Present: Senators Moss, Jackson, Allott, Fannin, and Hansen.
Also present: Jerry T. Verkler, staff director; Stewart French, chief counsel; William J. Van Ness, special assistant; and E. Lewis Reid, minority counsel.

Senator Moss (presiding). The committee will come to order.

We have some very interesting witnesses to hear today and a lot of ground to cover; so, we will begin without any further delay.

At the beginning, I want to insert into the record the interim report that was made by the Advisory Board on Oil Shale to the Secretary of the Interior which, I have discovered, has not been placed in this hearing record. In order to make it a more complete document and to understand more fully the problems we are discussing, I think that the interim report should be placed in the record.

In addition to that, I would like to place in the record an article that was prepared by H. Byron Mock, a member of that Advisory Board, who is an attorney. This article appeared in the *Denver Law Review* and discusses the way this matter was considered by the Advisory Board and gives some enlightenment and background, and the reasons for the various views that were expressed.

As is generally known, the Board was far from being unanimous in its recommendations, and this, it seems to me, is explanatory and helpful in that regard.

With these in the hearing record, it will be more complete and useful to the committee and any others who study the record.

In addition, I have a letter that has been sent to the chairman of the Committee on Interior and Insular Affairs by Senator Proxmire, which is an expression of opinion and a comment on the matter before the committee which will also be made a part of the record.

(The data referred to follows:)

INTERIM REPORT OF THE OIL SHALE ADVISORY BOARD TO THE SECRETARY OF
THE INTERIOR, FEBRUARY 1, 1965

I. INTRODUCTION

On June 30, 1964, Interior Secretary Udall announced the appointment of an Oil Shale Advisory Board to analyze the problems associated with development of oil shale deposits on Federally owned lands. In establishing this Board, the Secretary pointed out that "If the national interest is to be served, and this

resource is to make an optimum long-term contribution to the economic well-being of the Nation, the major public policy questions need to be identified and evaluated at the onset." This report contains the Board's recommendations on the Federally owned oil shale deposits.

In July 1964 the Board held its first meeting in Washington, D.C. at which the Secretary indicated the general nature of the problems and the Board's assignment. Representatives of the Geological Survey described the tremendous oil shale deposits of Colorado, Utah, and Wyoming, and staff members of the Bureau of Mines summarized the Research related to oil shale which has been done.

The second meeting took place in Colorado oil shale country in September 1964, and gave the Board members a chance to see the locality and its special conditions. In the latter part of November 1964 the third meeting was held in Washington, D.C., with interviews of selected representatives from industries, professional societies and other interested groups. The fourth and final meeting was held in January 1965.

In line with the Secretary's instructions the Board has dealt only with a selected number of problems and opportunities for oil shale development and conservation. It has endeavored to develop general recommendations on the critical issues, rather than to present a detailed treatment of all aspects of oil shale problems.

On most of the points covered in the following report the Board found substantial agreement. For the most part disagreements occurred in the section on *Means of stimulating development of oil shale*. Individual statements relating primarily but not exclusively to this section are presented in the last section of the report. In a very few instances differences of views of individual members have been noted in brief footnotes.

The Board members are Joseph L. Fisher, Chairman; Orlo E. Childs, Benjamin V. Cohen, John Kenneth Galbraith, H. Byron Mock and Milo Perkins.

II. BACKGROUND INFORMATION

The salient facts concerning oil shale development that must be taken into account by Federal oil shale policy are summarized briefly here.¹

The so-called oil shale deposits in Colorado, Utah, and Wyoming are actually marls containing an organic substance called kerogen from which oil can be derived. These deposits underlie a total area of about 16,000 square miles and represent the largest known concentration of hydrocarbons in the world. Shale yielding 25 gallons or more of oil per ton contains about 600 billion barrels of oil equivalent, and shale yielding 10 gallons or more per ton contains about 2,000 billion barrels of oil equivalent—an amount about 25 times the total oil produced in this country through all of its history. These resources are not uniformly distributed. About 75 percent of the known deposits are in the Piceance Basin of northwestern Colorado, and in that area the oil shale ranges from less than 15 feet in thickness along the margins of the basin to more than 2,000 feet in the center. An area in the heart of the basin of about 350 square miles contains some 600 billion barrels of oil equivalent, and in parts of this area a single 5,120-acre plot—the size of the lease presently provided by the leasing laws—contains as much as 18 billion barrels, an amount equal to nearly 60 percent of the Nation's proved reserves of petroleum. The oil shale deposits are also not uniformly distributed vertically; high-grade and low-grade deposits are locally interbedded, and in the Piceance Basin the richest beds are in two separate zones, a lower one and an upper one called the Mahogany zone. The regional and local variations in the thickness and character of the oil shale require extensive exploration prior to the development, all of which has by no means been completed; even so, compared with many other kinds of mineral deposits, including petroleum, the deposits require far less exploration to determine grade, thickness, and reserves.

Many of the oil-shale lands also contain oil and natural gas, sodium minerals, and ground water. Water—essential for sale oil refining, for the communities that would support the oil shale industry, and for many other existing or potential enterprises—is in short supply, and must be used wisely. The land surface itself through agriculture, grazing, wildlife and recreation is also of considerable

¹ Factual material in this section was furnished to the Board by the Department of the Interior.

value. Plans for mining and processing oil shale must aim not only at high recovery of the shale oil, but must take account of other resources and of the atmosphere as well, and work to preserve or restore their value.

Because of the existence of many unpatented mining claims, dating from before 1920, the title to some of the oil shale land is clouded. Aside from this land, the Federal government owns about 72 percent of the total oil shale acreage (78 percent in Colorado), and 79 percent of the estimated shale oil in place (82 percent in Colorado); depending on the resolution of clouded titles, Federal holdings may be a few percent larger in both acreage and oil. Even so, privately owned lands in Colorado contain 150-200 billion barrels of oil equivalent and known oil company holdings of 168,000 acres contain 31 billion barrels. Most of the privately-owned lands are either near the margins of the basin or along valleys where the oil shale crops out. Individual tracts lie in many different geologic and topographic environments and some of them may not be of a size or shape amenable to economic exploitation. Not all major oil companies or other parties interested in oil shale development own oil shale land, but recent sales indicate that private lands can be purchased for a few cents a barrel of oil equivalent in place. This low price per barrel is evident of the high cost of extracting and processing the material.

Oil shale is being mined and processed on a relatively small scale in a few foreign countries, and processes for retorting Colorado shale have been developed and carried to pilot-plant stage by the Bureau of Mines and the Union Oil Company of California. In the absence of full-scale development, production costs are not known but it appears that at best oil shale would be only marginally competitive with the petroleum industry today. For this reason and because capital costs are high and other sources of petroleum are now plentiful no commercial operations have been brought to fruition.

There is much evidence, however, of growing interest in oil shale in private industry, and there is widespread belief that technologic advance will bring production costs within competitive range. Eight companies have presently joined to support research at the Bureau of Mines installation at Anvil Points, Colorado; other companies are also undertaking technologic research; and the Federal government itself is continuing research that bears on oil shale technology.

In spite of the fact that the art of recovering shale oil is an old one, it seems to be still in its infancy, and many promising new approaches remain to be explored. The in-situ process, for example, under which oil would be formed and thermally driven from fractured ground without mining and without much, if any, effect on the land surface, is an especially promising process for recovering oil from the thicker and deeper parts of the basin. Considerable advance may be expected in oil shale technology. It should be noted, however, that several years lead time is required to develop a new industry *after* process development, so that even if technology were to advance rapidly it might be a decade before substantial production could be obtained.

Other factors besides the direct cost of production will also play a part in determining the point at which shale oil becomes competitive. The cost of conservation measures and the extent to which they must be directly borne by the industry, the availability and cost of oil and gas from other sources, and import and tax regulations all will help determine the price at which shale oil can be marketed profitably. Of these, the most critical is the cost of oil from other sources. Because oil shale can be made to yield either oil or gas, its place in the future energy mix depends on the extent to which it can compete economically with other sources of oil or gas. These include (1) undiscovered reservoirs of both oil and gas that may be found on further exploration; (2) oil remaining in known fields recoverable by secondary processes; (3) oil from foreign sources; (4) oil in tar sands and other bituminous rocks, particularly in Canada but also in the United States; and (5) oil and gas derived from the conversion of coal and other carbonaceous rocks. Each of these sources is potentially large, and the possibility of significantly enlarging production from them is being actively pressed by private industry.

Because of the availability of alternate sources of oil and gas, the case for oil shale development for the next few decades rests primarily on the economic benefit that would result if this large new source were to become available at competitive costs. That benefit however might be substantial, and significant other benefits might stem also from the increased geographic and physical diversity of energy sources.

III. BASIC POLICY OBJECTIVES

In spite of the extensive information already available on many aspects of oil shale and oil shale technology, the Board is impressed with the need for better knowledge about all aspects of oil shale, notably the processes and costs of developing it, and the hazards oil shale development may pose to other resources and human values. For these reasons, the Board is sensitive to the danger of premature commitment to a course that may later prove unwise. In fact, more important than any recommendation it might make as to specific courses of action is its overall recommendation that the government proceed cautiously toward development and maintain flexibility until the oil shale problems are better understood.

In its analysis of the oil shale policy question, the Board has narrowed the range of alternatives to a relatively small field. It agrees that oil shale development is not urgent to provide domestic supplies of liquid fuel for the immediate future, but it recognizes that at least several years lead-time will be required for the development of an oil shale industry. The Board agrees that oil shale development would not likely have a disruptive influence on the existing oil industry in the foreseeable future; moreover, it believes that orderly development of a competitive oil shale industry would provide future sources of oil of much benefit to the country.

The Board agrees that, whenever they may be leased, Federal oil shale lands should yield to the government a fair return for their value, that they should not be held for speculative purposes, and that development must take place only with full regard to conservation of other natural resources and human health. It also recognizes that the Federal government is going to have to play a major role in supporting research in conservation and health, particularly research necessary to develop conservation and health standards. In short, the Board agrees that the Federal government, working in appropriate cooperation with the States, should move positively but cautiously to encourage private oil shale development, with full protection of the public interest in the broadest sense, and that it must expect to provide some of the support, directly or indirectly, of the research required.²⁴

Guided by these considerations, the Board suggests the following objectives of Federal oil shale policy:

- (1) To encourage advancement of the technology of shale oil extraction and the development of a competitive shale oil industry.
- (2) To encourage wide industry competition and initiative in the development of techniques of mining and recovery.²⁵
- (3) To establish conservation goals and standards for the recovery of the oil shale resource for the protection of other values in and adjacent to oil shale lands, and for the protection of public health and related values.
- (4) To prevent speculative use of leased Federal lands to the detriment of oil shale development.
- (5) To provide for reasonable revenues to the Federal and State governments from the use of Federal shale lands.
- (6) To set up whatever Federal program may be decided upon in such a way that it can be administered effectively.

IV. MEANS OF STIMULATING OIL SHALE DEVELOPMENT

The means considered by the Board for achieving these objectives may be outlined in terms of three alternative courses.

- (1) For the present and until the processes and costs of shale oil production, and hence the true value of oil shale land, are better known, the Federal government, in addition to continuing its regular research activities, should actively support research directly or through contracts with private organizations. Such a course would not only help to advance the state of

²⁴ The terms "research," "experimentation," and "development" are sometimes confused since they tend to overlap in actual situations. Mr. Childs would call attention to the need for clear definition of these terms in the initiation of lease terms and development requirements.

²⁵ Mr. Galbraith would add "but only after government contract research has proved what can be done."

²⁶ For Mr. Perkins' dissent on this subject see his statement in the final section of the report.

the art and develop knowledge that would serve as the basis for developing wise conservation standards and practices, but would provide a basis for determining the fair market value of oil shale leases and for developing fair and practical leasing regulations before any ground is leased.

(2) The Federal government should open for private leasing upon application or on government's own initiative a few commercial-size tracts on competitive bidding, with firm performance requirements that would make it impossible for a company to hold the land indefinitely without developing it. Lease terms would provide for a Research stage for those companies not yet ready for full scale development, with performance measured in dollar outlay. By offering a small selection of nominated lands in increments (much as is done now in the case of the off-shore lands in the Gulf of Mexico), land values and conservation hazards would become known as the industry grows. This approach aims to rely principally⁴ on private initiative as a means for proceeding with needed research and the development of an oil shale industry.

(3) In addition to these alternatives, there is another that combines elements of both the others. Small tracts could be offered now for R & D; if the results show that commercial production is viable in the light of both economic and conservation requirements, commercial leases would follow. Such a course would foster both private initiative and research and would not prematurely release or commit any substantial part of the Federal holdings.

There are other possible courses of action, mainly combinations of those outlined above. For example, Federally sponsored research could be undertaken simultaneously with R & D leasing if the response to the R & D lease invitation were either limited in number or narrow in scope.⁴ But the alternatives described constitute the fundamental mechanisms of stimulating development considered by the Board.

Each of these three alternative means of stimulating development is consistent with the basic policy objectives set forth earlier. Each calls for an orderly approach to the release of Federal holdings and none envisions the release of more than a small fraction of Federal land until much more is known about production costs, conservation, and related problems. Individual Board members have not found agreement as to the merits of each course. Individual views are presented in the last section of the report.

V. CONSERVATION

In proceeding with the orderly development of an oil shale industry, consideration must be given to other values, including natural beauty, that may be reduced or destroyed by development. At the same time, consideration must also be given to the opportunities presented by development for creating pleasant and attractive communities and for improving the beauty and productivity of the countryside by reclamation programs on mined-out land. The importance of such considerations is rendered acute by the wide variety of conservation and related problems that may attend to the growth of an oil shale industry. Among these problems are water and air pollution; wind and water erosion; damage to vegetation, wildlife, and landscape; and waste of oil shale and other mineral resources, the recovery of which would be rendered costly by incomplete mining procedures. Some of these problems lie wholly within the area of responsibility of the individual operator, but others may be beyond his control and require State or Federal attention.

Conservation measures made necessary by development should to the extent feasible be regarded as a part of the cost of production to be met by the developing firm. This responsibility should be recognized as such in the lease terms. Here again, the Department should seek lease provisions that will encourage the operator to meet high standards in all aspects of the conservation and pollution field. A schedule of charges levied on firms and scaled to the amount of nonpermissible damage they cause to the natural environment and to persons and property should be considered as one means of dealing with certain aspects

⁴ For Mr. Perkins' dissent on this subject see his statement in the final section of the report.

of the problem such as water and air pollution. Consideration should also be given to allowing credit for improvement work beyond simple restoration.

The Board may expect industry to accept an important share of the responsibility for conservation measures required as a direct and local consequence of operations, and beyond this to undertake research on methods that will lower the cost of such measures. But the Government itself should also undertake research on coproduct recovery, waste disposal, the conversion of spent shale to soil, and similar problems, in an effort to swing the economic balance in favor of sound conservation practices. Even more important, government must undertake, or cause to be undertaken, the research necessary to establish Federal and State standards to be met and maintained by the operator, particularly in the area of air and water pollution and in treatment of the landscape. Close-down procedures and use of mined-out lands should be considered so as to assure an orderly disengagement from oil shale operations when that time comes.

VI. DISPOSITION OF LEASE REVENUES

Under the provisions of the existing Mineral Leasing Act, 37.5 percent of the revenues from oil shale leases are allocated to the State, 52.5 percent to the Reclamation Fund, and 10 percent to General Receipts (in Alaska 90 percent goes to the State). Revenues from the off-shore oil in the Gulf of Mexico go into the Federal treasury. The question of how revenues from oil shale leases should be allocated has not been considered in detail; it raises many basic issues of public finance that go beyond the purview of the Board.

It may be useful in future consideration of the problem, however, to call attention to the fact that oil shale is a contributor to regional income and employment as well as a national resource, and that the benefits of its development will accrue to both the oil shale States and the Nation. Similarly, the attending costs stemming from a wide variety of direct and peripheral effects of oil shale development will have to be borne in some measure by the State and Federal government. Whether or not these expenses are provided for wholly or in part from lease revenues, they must be accepted as part of the public responsibility in oil shale development.

In consideration of these facts, there is much to be said for a departure from the traditional allocation of revenues in the direction of a simple split between the States involved and the Federal government, with the expectation that each would use these revenues, or their equivalent, primarily to prevent or abate any public damages resulting from the oil shale development, to promote general resource conservation, and perhaps to further public education at the discretion of the legislative bodies. The Board recommends that the Department review the allocation of lease revenues and related matters along lines suggested here.

VII. FEDERALLY SPONSORED RESEARCH

While in general the Board would expect industry to conduct the research leading to and involved in commercial operation, there are problem areas in which the Federal government must see that the necessary research is undertaken either through contracts with private industry, universities, or research institutes, or by conducting the studies itself. One of these areas involves the establishment of the conservation goals and standards discussed above. The Government should also sponsor research on those scientific and technologic problems that are of such long-range importance or are of so broad a scope that they are beyond the reach of private industry.⁴ As a landlord leasing its holdings, the Federal government must also acquire better knowledge of the origin, distribution, thickness, and quality of the oil shale and of other resources that occur in the shale areas, and to bring the oil shale knowledge of Wyoming and Utah deposits up to that of present knowledge of Colorado deposits.

In addition to scientific and technical studies, the Federal government should do economic research, or induce others to do it, on cost trends, future markets, general labor and capital requirements, locational problems, transport, and the like. Longer range projections of demand for shale oil, all oil, and competing fuels, as well as projections of alternative supply sources and probable costs, should be prepared by the government as a kind of framework of trends and

⁴ For Mr. Perkins' dissent on this subject see his statement in the final section of the report.

possibilities for use of policy makers in both industry and government. Special attention to problems of meeting water requirements of shale operations and surrounding communities would be highly desirable, whether from surface or underground sources.

Progress in the development of oil shale is likely to be hastened if there is competition between several sources of fluid energy. It is in the public interest to advance the technology not only for oil shale but for competing sources also. What is called for is a diversified research and development effort by both government and private industry, with the several energy sources viewed as part of an inter-related energy industry.⁴ The temptation to go overboard for a particular energy source or technique at the expense of other equally good or even better ones should be resisted. Such result can arise as much from lack of encouraging the development of one particular energy source as from encouraging another. Improvements of R & D programming within the Department would be desirable.⁴ As noted earlier, economic research should form an important and integral part of the Department's energy research.

VIII. TAX AND IMPORT POLICY

In addition to leasing regulations, other policies and regulations associated with taxation, imports, and other fields will affect the oil shale industry.⁵ As with the question of the disposition of revenues, many of these regulations are a part of broad public policy beyond the scope of the Board. For this reason, the Board has not studied these questions in detail, and it makes no specific recommendations concerning them.

Any alteration in either the depletion allowance or the oil import quota would have considerable impact on oil shale development, as of course it would on conventional oil and other energy commodities. However, a distinction can be drawn between these two policy issues on the basis of the degree of uncertainty that needs be associated with them. In the case of quotas, periodic readjustment of the permissible level of imports in light of changes in domestic and international conditions is unavoidable. But in the case of the depletion allowance, a level and structure once determined would presumably remain in effect for an extended period of time. The Board understands that the Internal Revenue Service has indicated in an informal ruling that the depletion allowance would be 15%, calculated on the value of crushed, not retorted, shale. Any one of a variety of positions on the depletion allowance could be taken, ranging from treatment similar to crude oil to no allowance at all. The Board takes no position on the appropriate level and point of application of the depletion allowance. However, in view of indications that production costs are now low enough so that shifts in depletion allowance practice could carry oil shale production across the competitive threshold, it does urge that a final decision about these matters be made in the near future.⁶

Beyond urging that this element of uncertainty in the depletion allowance be eliminated, the Board views the matters of taxation and imports as so far reaching in their significance to the industries and markets for energy products, and to the regional and national economies, that this examination of oil shale development should not include recommendations regarding them, at least not without considerable further study. In the long run, the soundest approach to the development of a viable shale oil industry is to stimulate such development by advancing technology, and in other ways increasing the efficiency of shale oil extraction.

IX. CLOUDED CLAIM TITLES

The Board has not undertaken to examine carefully the contested oil shale claims, since this matter is now in the courts. However, the Board is convinced that uncertainty as to ownership of these claims could reduce the incentive for

⁴ For Mr. Perkins' dissent on this subject see his statement in the final section of the report.

⁵ Mr. Galbraith makes the following comment. There are no appreciable costs for discovery of oil shale. As noted in the report, the location and quality of reserves are largely known. When the development is on government land, it is obvious no privately owned wealth is being depleted. In the absence of discovery costs and assuming that private firms need not be compensated for the depletion of public property, there is no conceivable justification for a depletion allowance apart from the fact that the recipients, like all citizens, would enjoy the exemption from taxes.

⁶ For Mr. Childs' views on depletion allowance and exploratory costs see his statement in the last section of this report.

private action, and thus delay development of the resource. Prompt resolution of the contested titles would be most desirable. Such resolution is not seen, however, as a necessary precondition to more active research and development work.

X. INDIVIDUAL STATEMENTS

The following are individual statements of the Board members:

VIEWS OF ORLO E. CHILDS

MEANS OF STIMULATING OIL SHALE DEVELOPMENT

In the report of the Oil Shale Advisory Board, three alternative courses are outlined as guidelines for the Department of the Interior in action to be taken to encourage the development of shale oil industry. As indicated by Secretary Udall at the start of Board deliberations "... the major public policy questions need to be identified and evaluated at the onset." Clearly the most basic policy question is "Will public lands be made available by lease arrangements to allow a shale oil industry to be spawned, developed, and carried forward by private enterprise in the American mineral resource tradition?" To the writer, a positive position on this question seems to be the development of the strongest possible policy to insure economic and efficient development and use of one of our nation's greatest untapped fuel resources. Too much government intervention in the form of tight regulations or threat of production competition can only retard or eliminate the interest of private capital, thus leaving government alone to invent an industry and control and economy into which it must fit that industry.

In the stimulation of shale oil development beyond that now under way, alternative number (3) as stated could only be considered as a very small enlargement of the present opportunity to do research. At present, eight oil companies are pursuing shale oil research under a permit contract with Interior, using facilities under lease to the Colorado School of Mines Research Foundation, Inc. Any other company as it deems advisable can enter into other research arrangements to do work at Anvil Points. The interest already shown can only be expected to decline if a policy of making public oil shale lands available is not soon adopted and announced. Surely the announcement of research leases alone, without the promise of available commercial holdings, could not be expected to function as a stimulant. It could hardly be an appetite appeaser.

Alternative number (2) as described in the report, or a comparable policy that might be announced by the Secretary in the near future, would, in the opinion of the writer, create the greatest stimulus to shale oil development. The lack of announced government policy as it affects three *basic problems* has caused the reticence with which many companies view the imponderable economic aspects of a new shale oil industry. It is hoped that the first problem, that of depletion allowance both as to amount and point of application, might soon be solved under the full realization of economic impact on the industry.

The second problem, the conditions of availability of public lands would approach solution with conditions as outlined in alternative (2). Some companies have gone ahead with research to determine processes for developing private holdings, others have worked in anticipation of favorable policies to be developed. Certainly all must be able to foresee every possible economic aspect of an emerging industry before it is possible to face the enormous initial costs of commercial scale development.

The third problem, the need for research, is also tied to the conditions under which public land is to be made available. We must not think that all process research can be restricted to a preliminary phase of oil shale development. Because of many unknowns, once basic processes are decided upon, research must go hand in hand with daily production. Differences in marlstone composition, in sedimentary structures within the rock, and sulphur content together with other impurities may require vast changes in process planning from day to day. Research *and* production costs are part of the development of the natural resource. Production requirements within a lease should recognize all these expenditures as true effort toward resource development. When recognized, this work is a safeguard against speculative land holding.

The determining factor that will allow a shale oil industry is the energy economic climate. In order to assess the true competitive position of shale oil, as many costs as possible must be entered into the operational equation. The size

of capital investment is enormous, and long-range planning is mandatory. Immediate availability of selected lands must be established within the framework of a policy that will assure future availability as required by a healthy industry. This is the objective of alternative (2) and the strongest stimulation of an emerging industry would be achieved by such a policy.

DEPLETION ALLOWANCE AND EXPLORATORY COSTS

When a lease is given the lessee becomes the owner of the asset he has leased. The public interest is served by the bonuses and royalties paid for the lease. It is a cardinal principal of our tax law that the tax fall only on income and not on the capital that produces the income. Historically and traditionally the depletion allowance has been aimed at providing for the return, to the owner, of the value of the capital asset that is used and not replenished as it is produced and sold. In an oil shale industry this depletion concept must be taken into consideration along with exceptional and unusual costs of exploration and development. Geological information that exists about present oil shale deposits is generalized at best. Specific details require close spaced core drilling, costly process research, and plant construction all tailored to the problems of a particular lease-hold. This investment must be added to the cost of land-lease acquisition. All this investment may be considered as "exploratory costs" that would be abandoned at any time upon the decision to cease activity. If activity continues the mining and retorting plant with a capacity of 50,000 barrels of oil per day must be built at an approximate cost of \$100,000,000 before the first return on investment can be achieved.

VIEWS OF JOSEPH L. FISHER

The general object of government policy, as noted in the main body of the report, should be to offer encouragement to private industry in the development of the oil shale resource with full and proper protection of the public interest. In the matter of precisely how to stimulate the development of oil shale (see Section IV) there are differences of view among the Board members, although all agree on the general developmental objective. These differences, I believe, are due largely to a lack of sufficient knowledge as to the technical and economic merits of various mining and processing methods. My preference is for a course which would emphasize research and experimentation as the next phase in the creation of a competitive oil shale industry.

This could be achieved in two ways: (1) by providing access to Federal oil shale land, with public interest safeguards, for purposes of research and experimentation on any and all phases of shale oil technology, in the hope that this would stimulate interest in pursuing such research; and (2) by government contracting with private industry, universities, foundations, etc., for specific lines of research, or if necessary conducting research itself. I would not want to exclude either of the two avenues. Whichever course is followed, or if both are followed, I would hope that qualified companies and perhaps groups of companies would want to undertake the actual doing of the research preparatory to development of an oil shale industry.

Leasing for purposes of stimulating research and closely related development (not including commercial scale development) has the advantage that it relies more on private initiative and may make for an easier transition to commercial leasing, once this is warranted. At the same time, such leases, which would actually be more in the nature of permits, should be sufficiently qualified so as to prevent land speculation (see below). Finally, and quite importantly, providing access to Federal land might encourage companies not now owning any suitable land, to engage in research and development of the various phases of extracting and processing the material.

As against these merits of leasing or permits, there is the undeniable fact that in the past industry as a whole has not been especially aggressive in its R & D activities regarding shale oil; this despite the fact that more than 160,000 acres of oil shale land are owned by oil companies. It is possible, therefore, that research permits will not quicken the pace of progress. Therefore, government, both Federal and State, should be ready to play a more active role in sponsoring or conducting research if it becomes evident that the leasing route does not elicit a satisfactory response. Most of the research, in this case, could probably be arranged through contract with private companies, but some might also be done directly. Important research is now being done in Government laboratories.

In the past experimental pilot type work has been done by the Government at the Rifle plant. This work continues under a Government contract with the Colorado School of Mines Foundation. In some areas of technology and economics in which private groups have less interest, the Government might even elect to advance research via direct contracting from the beginning (as detailed in the Board's report under the heading "Federally Sponsored Research").

I, therefore, suggest that the Government prepare to pursue both approaches:

(1) To offer a few small tracts of a size suitable for R & D to companies wishing to do R & D on Federal land and with a capacity to do such work effectively. The companies would be expected to provide a basis for determining the size of the tract by indicating in general the kind of research they would do. Performance requirements should be established and might include stipulated annual expenditure in specified categories of work. Such leases or permits, might run for a period of up to five years, subject to annual review, to see that genuine and substantial research was actually being undertaken. Toward the end of the lease period the government and the company should consider whether to renew the lease with the same or changed conditions or to extinguish the lease with the land reverting to the government. In addition to acquiring valuable know-how, such companies could apply for patents on any new processes they might work out, in accordance with patent law and procedures. The government should permit sale or transfer of ownership of such leases, and of installations the holder may have developed, but the separate performance requirements for each lease unit should not be waived except when the public interest requires.

(2) To put itself in a position to contract for R & D with private companies or to conduct such research itself. This would insure that the public interest is served through advancing research along various promising lines, any one of which might later result in successful application. To accomplish this purpose efficiently the Government should without delay set up long-range research goals in this field that would enable it both to evaluate progress made by others and to appraise the need for the role it should play as an active contractor for or participant in research.

As a further way of inducing companies to undertake needed R & D, whether by research leases or research contracts, it is suggested that from the outset the Government make clear its intention of offering a limited number of commercial size tracts of public land for competitive leasing, say, five years from the date of the beginning of the R & D stimulation program. This might be in four years, six years, or some other period of time; the important point is that the government intention be made clear from the start.

These tracts of land should be suitable in acreage and oil content to support one commercial scale mining and processing unit. To give a special incentive to companies to undertake R & D, one might consider limiting the initial group of leases to those companies which have actually undertaken R & D, on public or private lands. Significant laboratory research might also qualify companies for this advantage. While it is true that such a selective approach calls for substantial judgment and discretion on the part of the Government to prevent abuse, this is no reason for disqualifying it. As an alternative, those companies which have done R & D might be given preference to the extent of accepting their bids if they were within, say, 10% of the lowest acceptable bid.

Certain conditions should be established as part of any commercial scale leases, whether they follow successful research done by permit or by contract. There should be suitable performance requirements; for example, commercial scale production would have to begin within, say, three years of the time the lease was signed, and would have to continue thereafter with suitable protection to the companies in case markets were not found for the product. The leases should also contain certain requirements regarding conservation as indicated in Section V which deals with this subject. Royalties would be collected on each barrel of oil produced. At present, 12½ percent of the value of each barrel of oil is collected in the case of oil produced on onshore public lands, and 16½ percent for oil from the offshore submerged lands. The government might also want to establish a minimum bonus based on the acreage of land, estimated reserve of oil, or some other suitable magnitude. There is no need for haste in setting desirable levels, since additional supplies of oil from this new source are not now urgently needed and competitive production of shale oil has not yet been demonstrated.

The commercial scale lease land might or might not include an R & D leased plot. Ways should be found so that companies which qualify to assume com-

mercial scale leases could lease land which would round out private holdings in instances where this would be the sensible course. Companies should not be permitted to obtain leases of public shale land simply as a means of holding good private land as a reserve for either speculation or production at some indefinite time in the future. It should be recognized that the approach and the policies recommended here are not intended to commit the government or private companies to particular kinds of leases or lease terms for all time. Periodically, the government should review leasing terms and procedures in close consultation with industry and others interested to see what modifications, if any, might be made in later leases. The point is to employ leasing policies for commercial scale tracts so as to give a degree of encouragement to the development of an oil shale industry, particularly the needed R & D phase which must come next in time, without in any way jeopardizing the public interest.

The broad intention of these recommendations should be clear: it is to offer a reasonable degree of encouragement through appropriate R & D and subsequently commercial lease arrangements so that the oil shale resource may be developed, when the time is ripe, by private industry, with adequate incentives to private companies and adequate protection of the public interest in the development of a resource which is owned by all the people.

VIEWS OF JOHN KENNETH GALBRAITH (WITH CONCURRENCE OF BENJAMIN V. COHEN)

THE CONTROLLING FACTS

- (1) This report is right in stressing that the oil shale deposits, underlying some 5,118,000 acres in Colorado, Utah, and Wyoming, are a publicly owned resource of great magnitude. Several hundred years' supply of petroleum at present consumption rates exist in these beds on lands owned by the people of the United States. Foresighted efforts in the past have kept these lands from those who, under the sanction of private enterprise, view public property only as an opportunity for personal profit. Having withstood thoughtfully designed raids in the past, it is important that the government show equal wisdom and restraint in the present on behalf of our resources for the future.
- (2) The American people are not presently aware of the wealth they own in these deposits. It is important both for the conservation and wise and equitable development of these resources that there be the widest public knowledge of this endowment and the issues concerning their exploitation. An informed public will be a major source of strength to officials seeking sound conservation policies. We urge that all conservation-minded members of the Congress and the public inform themselves fully on this vast resource and policies concerning its use.
- (3) The amount of oil underlying any given area varies greatly. But the enormous concentration under the richer areas, as noted in the report, must be stressed. In the richest parts of the Piceance Basin some sections of 640 acres are estimated to contain $2\frac{1}{2}$ billion barrels of oil. Current total consumption of oil in the United States is about three billion barrels annually.
- (4) While some eighty-five percent of the shale measured in barrels is in public ownership, the remainder is in private hands. Much of this is owned or controlled by the larger oil companies. Present known private oil company holdings of 168,000 acres contain an estimated 31 billion barrels, the equivalent of ten years' current total consumption for the United States.
- (5) As noted in the report, while high quality oil has been produced in small quantity from oil shale, an economical process of recovery has yet to be perfected. While it seems likely that such a method can be developed, the costs of such development are unknown. Hence the eventual costs of production of shale oil are unknown.
- (6) There is no showing of urgent economic or strategic need for oil from shale in the present or near future. The domestic petroleum industry is operating under severe government restriction. Imports are subject to quota. These sources are almost certainly cheaper than oil from shale by prospective processes. Hence there is no pressing peacetime need for oil from shale. Given the most rapid development, the share of oil from shale in total production will be negligible for many years. Hence it will not, in the foreseeable future, be an important wartime resource replacing any important present source of petroleum. We cite this because strategic arguments are regularly advanced for oil shale development.

They appear to reflect only the common effort to find a national security justification for action that individuals or groups would find in their economic interest.

(7) There is strong pressure to develop an oil shale industry in the states involved for the beneficial effect on local incomes, employment and property values.

(8) The major oil companies are naturally concerned with protecting their position in the event of the development of an oil shale industry by buying or controlling oil shale acreage. However with one or two exceptions they seem not now inclined to incur substantial development costs to produce shale oil. Certainly for companies with alternative sources of petroleum the economic attraction of oil shale is not high. The incentive to control oil-bearing acreage is thus, for the time being, much greater than the incentive to produce from it. This incentive, however, is very strong and strongly indicated by present efforts to obtain acreage in the area. The Shell oil company has proposed that it be granted leases of 50,000 acres of the oil shale lands in the central area of the Piceance Basin. These are estimated to contain 150 billion barrels of oil. This would suffice to cover *all* of the Shell's oil requirements at the present rate of refining for an estimated 660 years. It is the equivalent of roughly five times the total of *all* proved petroleum resources in the United States. Sinclair has made requests that would suffice that company on the same basis for an estimated 226 years. Modest requests from Humble and Continental for approximately 5,000 acres would cover the total present production of each company for 54 and 27 years respectively. We believe that much of the current interest in leasing is related not to a desire for development but to a desire to control land. We stress again the richness of seemingly small areas well below what many might characterize as a "commercial scale" lease. The Department of the Interior estimates that some 1,000 acre tracts in the heart of the basin contain as much as 3 billion barrels of oil, the equivalent of a year's consumption at current rates for the United States as a whole. As noted, 5,120 acre tracts in this area contain as much as 18 billion barrels of oil, the equivalent of 55 per cent of the nation's total proved reserves of petroleum.

(9) Part of the oil shale lands belong to a Naval oil reserve. This and the very large quantities of oil in small acreages, and subject to requests such as the above, would seem certain to stimulate recollections of past experience with Teapot Dome and Elk Hills. This suggests that public policy toward these lands should be even more than normally circumspect.

CONCLUSIONS

(1) We agree that it is not sound policy to lock up important resources. We gain in wealth by using our natural wealth and doubtless will continue to do so. There is good reason, accordingly, to seek the development of effective and economical processes for recovering oil from shale.

(2) Alternative fuel supplies are, however, wholly sufficient to permit orderly and equitable development of shale oil resources. Extravagant, windfall or unknown rewards need not be paid for hurried development. There need be no irrational or helter skelter alienation of this public resource. All who believe in conservation must resist such course.

(3) The interest of the people of the immediate area in development is understandable. But the resource in question belongs to all the people of the United States. Their interest is paramount.

(4) In the early deliberations of the Board it was urged that development was being held up by the unavailability of public lands. On examination this contention fails to stand up and little was heard of it in our later deliberations. Development is *not*, in fact, now being restricted or curtailed by the fact that the larger part of the reserves are in public hands. Oil companies that are as competent as any in the country for development now own in fee simple shale resources far beyond any conceivable requirement for long term development. They are being deterred not by government ownership of other land, not by fear of what the government may do with these lands, but because of the costs of development and because the further economics of production, as compared with alternative costs of crude oil, are either unclear or unattractive. We conclude that the charge that government ownership is holding up development is based on either ignorance of the size and richness of present private oil company holdings or an effort to turn local pressure for development into pressure on the Secretary of the Interior to lease the lands.

(5) A case has been made, by some members of the Board, for leasing public lands "in commercial size leases" of otherwise unspecified size to oil companies, including those that now are holding extensive private lands, on terms that would encourage them to do research and development on shale oil production. The leases would be conditional on spending specified sums for such research and development in the field of shale oil production. Any such course of action must be rejected. It would be inconsistent with wise conservation practice and gravely damaging to the public interest. Specifically:

The cost of development is unknown.

The cost of production is unknown.

The recoverable value of oil in the land offered for lease is imperfectly known.

Given these unknowns the government would be offering a subsidy of unknown value for a development of unknown cost promising a return of unknown amount. This amounts to dispersing public property while wearing multiple blindfolds. It would be justified, if at all, only by the absence of orderly procedures or the need for greatest haste. Neither justification exists.

Genuine research effort is impossible to measure. The company that put on a show of research cost and effort and waited for a research breakthrough that it could imitate might well profit equally with a firm that did serious work.

While competition has virtue in many spheres, it is not the normal recourse for research on major new technologies. In the case of nuclear development, space development, military development or water desalinization, the established practice is to contract with one or a small number of firms for a defined task.

The foregoing view is supported, at least partially, by the oil industry. One company, in its presentation to the Oil Shale Advisory Board, noted that intelligent leasing would first require further research and development work and that to issue leases contingent on development would be impractical.

Those supporting this proposal speak of Research and Development leases—R & D leases—as though they were a commonplace practice. In fact, the Department of the Interior assures us that it has no precedent for the grant of a lease to encourage "research and development on underdeveloped industrial processes" and that it has never issued such a lease.

Leases seriously contingent on development would be possible only for large firms with significant research establishments. Smaller independents would be excluded.

As noted, no one has defined a commercial size lease. In the absence of such definition, and having in mind the large quantities of oil underlying very small acreages, extremely large quantities of oil could be alienated in the course of leasing seemingly very modest areas of land. We do not assert that this is the purpose of the "commercial-sized" lease, but plainly it could be the result.

The main body of the report rightly speaks of the need for protecting landscape, preventing pollution and conserving water. But what is required here will depend on the recovery process employed. This will vary greatly with the process employed. It will be totally different for retort and *in situ* recovery. The proper conservation practices cannot be specified if it is not known what practices will be required.

The leasing of very small tracts for Research and Development is merely the use of a smaller amount of public property as a subsidy to development. And again what is "small" remains unspecified. (One one-hundredth of the request of Shell or Sinclair would still be a great deal of oil.) In informal conversation it has been suggested that a small lease might be not more than fifty acres. This would not involve serious alienation of public resource. But it is difficult to say that it would be any incentive especially to companies which now own, in fee simple, many times this area. We reluctantly conclude that the small R & D lease came into the conversation only when the "commercial-size" lease could no longer be defended and on the theory that to alienate a little public property for an unknown result is better than to alienate a lot for an unknown result.

We conclude, accordingly, that the R & D leasing would result only in transfer of lease rights to private owners and there is no certainty or strong likelihood that it would lead to development. It would thus be disappointing to local communities and the region. Their interest, we believe, is in far more secure and certain development procedures that are unclouded by the danger that land will be alienated, in accordance with the primary present interest of producers, and not developed.

(6) There is a businesslike, certain and straight-forward course of action. It is for the Department of Interior, under appropriate authorization, to enter into contracts with interested firms, tested by competence, to develop methods of mining and processing or *in situ* recovery of shale oil. This is the established procedure for work of this kind. It is safe, orderly, economical and consistent with the public interest. The resulting process or processes would then be available on general license. This procedure will require public funds. But it is obviously unsupportable economic procedure to try to save dollars by dissipating public property of unknown but much greater value. This procedure will be no more inimical to private enterprise than similar government research and development contracts held by hundreds of private companies including oil companies. Suggestions to the contrary are merely a smoke screen designed to exclude a prudent government policy for the development of this resource. We note that the most ardent advocate of R & D leases is favorable to all forms of government research and government control except that which might be paid for with oil shale lands. This is opposed.

(7) Once a process (or processes) is developed and proven out rates of recovery and costs will be known. With modest additional expenditure on drilling the government can establish the value of acreages which it chooses to lease. It can also specify the conservation practices that are required. It can also specify the rate of development, since there is known process, which is necessary to keep the lease in good standing. It can also relate the amount of leasing to need. And, since process, costs of production and the value of the deposits are known, it can negotiate or otherwise issue leases which allow a fair return to the companies and insure an equitable return to the people of the United States for their property.

(8) Under the foregoing procedures development will go forward and without risk that leasing will be a cover not for development but merely for the control of the land.

Under this system *necessary* public land would of course be made available to the contracting firm. And it is consistent with this proposal that necessary land be made available to firms wishing to do research on their own account and for this special purpose. This is especially justified if the firm does not have land in the area. This is further discussed in the associated concurring statement.

(9) Assuming that the R & D leases are serious undertakings, and not devices to gain control of the land, they still exclude companies incapable of undertaking research on a serious scale. The above procedure would allow of the participation of any company able to finance the known recovery process.

(10) Leasing may well be preferred by at least some of the oil companies. This is natural. Even with grants of land far smaller than those presently being requested, it promises to provide a large and potentially valuable resource for a modest cost. That leasing may convey large capital values for a modest development outlay is not an argument in its favor.

(11) The fact that competitive leasing may work well for petroleum exploration is no argument whatever for its use to encourage research and development. The two situations have nothing in common except the end product.

(12) We have been told that the Congress will not authorize appropriations for contracts for the development of oil shale processes. Rather it will succumb to pressure from some oil companies and aspiring lease holders to resist such a course of action. This is an admission that the real interest of those resisting such appropriation is the alienation of the land not the development of the resource. Such obstruction is obviously not a mandate for Executive action that plays into the hands of those who obstruct.

VIEWS OF BENJAMIN V. COHEN (WITH CONCURRENCE OF JOHN KENNETH GALBRAITH)

The development of a shale oil industry is not presently impeded by lack of access to shale resources in the public domain. While there are tremendous shale deposits on government lands, there are also abundant deposits—the equivalent of vast oil pools—on private land, and adequate portions of these deposits are in the hands of large private corporations capable of proceeding from research and development to commercial operations whenever commercial operations become economically feasible. There seems to be reason to believe that the industry may be approaching a break-through and that commercial operations may become feasible within the next five or ten years.

As the time for profitable commercial operations approaches, companies and individuals naturally become interested to stake out claims to develop shale deposits on government land. But it is not at all unlikely that there will be greater advances in the technology of extracting oil from shale in the next five or ten years than occurred in the last half century. This makes it all the more important that the federal government guard against granting rights which might interfere with the orderly and efficient use of these shale resources and the conservation of other resources and values which may be affected by their use. The government must guard against the cannibalization of the mountain-side, the pollution of streams and the imprudent use of their precious waters, which may occur if government subsidizes or encourages commercial operations on public lands in the present stage of relatively primitive shale technology.

For these reasons I think the government should at this time encourage research and development as outlined in the first alternative course in Section IV of the report and should refrain from binding itself to commercial leases until it knows much more about the value of the leases it is offering and the effect of the technological processes to be employed on related resources and values. I should not object to the government giving permits for research on limited areas of the public domain if the applicants could satisfy the Secretary that the projected research would be likely to contribute significantly to the advance of technology in extracting shale from deposits in the area covered by the permit. If the Secretary later found, as a result of such research, commercial operations in the area were feasible and in the public interest, he might be authorized to ask for competitive bids on a commercial lease and to give to the holder of the research permit a preferential right to obtain the lease if its bid was not significantly below that of the highest bidder.

COMMENTS BY H. BYRON MOCK

I address my remarks directly to the draft of February 1, 1965. With the words of the Report it is difficult to take exception. My objection is that those words fail to state certain key conclusions required by the evidence, but state other conclusions which the Committee could not have independently reached on facts before it.

First, the key question is whether the 1930 Executive Order withdrawals of oil shale and from leasing should be lifted. Nowhere is that question directly discussed. Without a yes or no answer, the Committee Report has no significance. The question is not whether the specifically reserved Naval Reserve Oil Shale lands are to remain set aside, but whether other Federal lands are to be opened. Second, because the first question is unanswered, we must ask, can the National need for an oil shale industry (there appears to be no difference of opinion as to the need, only as to the method) be developed on private holdings alone? Third, also because the first question is unanswered and even if the second is answered affirmatively, can private capital be expected to develop an industry on the less rich deposits when it is unknown whether their economic calculation and "lead time" may be destroyed overnight by opening the richer Federal deposits or by developing them as a Government operation?

Fourth, because the first question is unanswered, and the second made unanswerable by the third, the third is unanswerable until this fourth question is answered. Is it contemplated that the Federal Government may operate the oil shale reserve as a Federal operation?

The answer seems clear from the facts considered by the Board. It is in the public interest to develop an oil shale industry. The problem existent indicates that by the time oil shale is supplying a substantial share of the energy needs the phasing in will have had little, if any, effect on other energy industries. While the vastness of the kerogen resources is offset by the expense of extraction and unknowns in the processes, private capital is prepared to proceed if it is not barred by governmental action. The National interest is best served by immediate commencement; unnecessary obstacles to development are against the public interest.

The goals stated in the February 1 draft are clear and explicit. As is to be expected, the method of accomplishment are the points of difference. If the above questions are answered, methods consistent therewith should be easily determinable. The methods of implementation are not necessarily ones for the Board to recommend. We received no briefing on problems and solutions faced

in off-shore oil development, received no analysis of analogous potash, oil and gas, coal and other resource programs where years of experience have provided precedents nor did we receive other bases for independent conclusions. Without that breadth of experience we could not objectively choose between methods. However, the Board purports to comment on methods. To this I object since the factual information before us did not justify, and to adopt views on methods is to accept proposals presented to us without exercising our independent judgment as to their justification.

The heavy emphasis in the Report on governmental Research and Development (R & D) is one example. No successful company proceeds without adequate investigation of techniques, market, economics, evaluation of resources and like matters to ascertain whether their hopes are sustained by hard facts. The report purports to give control to Government agencies on what is to be investigated and when such investigation is successful. If the Government officials are not satisfied they can perform the work themselves. If this is not the intent, the proposals could easily produce that result.

Similarly the Board received no briefing on departmental R & D programming. I see no justification for our recommendation for its improvement in the top paragraph on page 11. Other examples of assumptions without factual bases are the implications that no company is now ready to proceed, that all areas have identical problems, that all companies are at the same stage of development, that no new companies without private holdings are interested, that there would be no protection for other values without Federal action and that until more is known of this valuable resource, it cannot be entrusted to developers. Contrariwise, note that Union Oil Company is recognized as being in a stand-by position; that Piceance Basin deep deposits probably cannot be strip mined, but that Utah and other areas of deposits, might be; that the newspapers carry accounts of numerous applications seeking public land leases; that there is a State policing power; and that the off-shore oil lands were successfully developed with less knowledge of reserve than now exist on oil shale deposits.

Rather than to be merely a critic, I propose the following essential steps:

- (1) Lifting of the Executive Order withdrawal.
 - (2) Concurrently, issuing regulations prepared by Interior in consultation with interested parties preferably with a 6-month deadline.
- For consistency with the goals proposed by the oil shale Board on page 6, I suggest the following general provision.

(a) A royalty, sliding scale royalty, periodically renegotiated royalties, or some combination to insure adequate revenue return to the Government, without destroying the economic feasibility of the oil shale industry.

(b) Putting up known deposits of oil shale for competitive lease upon either nomination by applications, or upon Government initiative.

(c) Fix the areas of each lease at 5120 acres, or such lesser amount as is found to be an economic unit to support the investment involved. (There are many ways to determine an economic unit. One, which I do not necessarily recommend, but which shows a method, is the pattern in many States of competitive bidding for tax land, where the amount is fixed, but the winner is the one who bids that amount for the least acreage).

(d) Require certain developments for each unit on increasingly stringent terms so as to minimize speculative holdings. Each unit should be considered separately.

(e) Establish conservation goals and standards and provide contractually for them in leases, but recognize that oil shale production is itself a public interest factor and that when a lease is issued, it should not load the lessee with "conservation" costs so as to make production uneconomic.

The above states my essential views. I regret that time pressure makes more pointed and complete presentation impossible. Insofar as the Report is consistent therewith, I concur.

DISSENT OF MILO PERKINS FOR THE FINAL SECTION OF THIS REPORT

It has been clear since our first meeting seven months ago, that there was only one fundamental area of disagreement. This has run like a thread through all the many drafts of suggested reports submitted to the Board.

Some of us believe that our great shale oil resources should be developed by private industry, much along the lines which the Interior Department has supported in the case of our off-shore oil resources.

Others, with equal sincerity, believe that our Federal Government should play a dominant role in shale oil development, reserving to itself the full powers of policy formation on a continuing basis into the indefinite future.

The present draft is, in a relative sense, less objectionable than previous drafts from my point of view. I have therefore agreed to sign it since the privilege has **now been granted Board members**, in this section of our Report, to publicly express their own dissenting views.

MEANS OF STIMULATING OIL SHALE DEVELOPMENT

I strongly support the second alternative in Section IV of our Report, with one vital dissent. I believe that the word "principally" in the last sentence of alternative No. 2, Section IV should not have been used.

The sentence now reads:

"This approach aims to rely principally on private initiative as a means for proceeding with needed research and the development of an oil shale industry."

The introduction of the word "principally" nullifies the agreement by Board members at our last meeting. We agreed then to disagree on *clear-cut* alternative means through which oil-shale development might be stimulated. A reservation, therefore, in one of those three alternatives is inappropriate.

Now to continue with what seems to me to be the most effective means of stimulating oil-shale development. Insofar as efficient production is concerned research and development are not separate activities. They are parts of a single process. They interlace constantly in the actual world of work. Any effort to separate them leads to endless confusion—particularly when the effort is made by government in an essentially private area of our economy. Our second alternative in Section IV avoids this confusion.

I think that research and development to improve the art of shale-oil extraction can most effectively be undertaken by private industry itself—with an eye to future commercial production. The private sector of our economy has done an extraordinary job in the field of research, when that research has been directed into channels looking toward efficient, profitable production for competitive markets.

I see no reason, therefore, why government itself should finance research work to advance the art of shale-oil extraction. By way of illustration, production of off-shore oil and gas certainly had its early research problems. In this fairly recent instance, our Government did not try to establish a value for these underwater areas by research of its own or by contract research.

Rather, it permitted industry to establish the value of these off-shore areas by competitive bidding and leasing. Government revenues under this procedure have constantly risen as the art advanced—and as successive areas became available for further leasing and production.

Private industry did this off-shore research and development job and did it so efficiently that energy from beneath the sea is now available to all of us in the market place at prices which are competitive. Why *shouldn't* we turn to industry to develop a competitive shale oil business?

Roughly half of corporate profits are now taken in taxes by the Federal government; another slice is taken by the States; and stockholders pay additional taxes on dividends they receive as individuals.

As a successful shale-oil industry gets under way, additional revenues will accrue to both Federal and State governments, as they already have done in the case of off-shore oil. The second alternative in Section IV of our Report strengthens this healthy process. Under it, government will not be required to engage in those costly research and development activities related to production which have been a traditional function of the private sector of our economy.

Inasmuch as our Government controls the major portion of our richest shale-oil reserves, it does have deep public responsibilities stretching many decades ahead. I have always recognized this fact. Therefore, I've urged early but limited moves by Government to encourage industry to advance the art of shale-oil extraction at competitive prices, much as it did in the case of off-shore oil and gas.

There are many variations of leasing arrangements on publicly controlled lands by which this can be done. We can make haste slowly and learn as we go along. We just don't know enough at this point to lay out a complete program.

Now for three short paragraphs on alternative No. 1 of Section IV. Some of our fellow Board members feel the Government should finance oil shale research indirectly by contract with private research companies. They cite the successful experience in military and space procurement activities.

The development of shale-oil seems to me to be in a completely different category. In the case of missiles or space-craft, *only* government can be the final "customer". Therefore, such contracts make sense.

The private sector of our economy would be the customer for most of the shale-oil. Therefore, profit incentives for private research to produce cheaply and effectively for a commercial market is in keeping with what business has always done—and done well.

FEDERALLY SPONSORED RESEARCH

First of all, I support *both* State and Federal research on such matters as:

1. The establishment of health standards and of conservation goals and standards under which industry must operate. Government must fairly establish these *ground rules* under which competitive business is required to function. It then becomes the job of business men to meet these criteria in their day to day operations.
2. Deeper knowledge of the quality, thickness and distribution of oil-shale in States where too little is now known.
3. Economic and engineering studies dealing with water requirements, both from surface and underground sources. This is crucially important to the future of a shale-oil industry.
4. Air and water pollution problems.
5. Waste disposal and the conversion of spent shale to soil.
6. Wind and water erosion problems.

This list is meant to be indicative rather than inclusive. It would certainly *not* rule out such work as broad economic studies by the Federal government on the supply and demand situation for all fuels needed by the entire nation. But it *would* rule out those narrower Federal research and development activities traditionally regarded as being within the province of industry. These activities deal primarily with the interlacing techniques of research, development and production in a competitive society.

I would now like to quote a few sentences from our Report and to comment on them:

1. At the end of a paragraph in Section III, dealing with "Basic Policy Objectives", this sentence occurs:

"In short, the Board agrees that the Federal government, working in appropriate cooperation with the States, should move positively but cautiously to encourage private oil-shale development, with full protection of the public interest in the broadest sense, and that it must expect to provide some of the support, directly or indirectly, of the Research required."

I agree with all of this sentence, except the last phrase stating that the Federal government "must expect to provide some of the support, directly or indirectly, of the research required."

What types of Federal research—in *which* areas of both the public and private sectors of our economy—are intended to be covered by this language? If it covers *only* such areas as the six points I made at the beginning of this dissent on Federally Sponsored Research, then I support this entire sentence of our Report as written—and I support it without reservation.

Even in Section IV of our Report, however—originally intended to give dissenting Board members three *clear-cut* alternatives on Means of Stimulating Oil Shale Development—this strange sentence occurs:

"Federally sponsored research could be undertaken simultaneously with R and D leasing if the responses to the R and D lease invitation were either limited in number or narrow in scope."

What a curious place to get in another "plug" for Federal research, without defining it in *concrete* terms:

I believe there is a vital area for government research and a vital area for private research. Unhappily, the *line of demarcation between the two* has never been made clear in any suggested draft submitted to Board members—notwithstanding our sharp differences of opinion on the subject. The current draft is no exception.

2. In Section VII, on Federally Sponsored Research, this sentence occurs:

"The Government should also sponsor research on those scientific and technologic problems that are of such long-range importance or are of so broad a scope that they are beyond the reach of private industry."

Just what *are* those specific research problems, in *what* scientific and technologic areas, that are of *such* long-range importance, or are *so* broad in scope, as to be *beyond* the reach of private industry? Just *which* government official, under *what* Congressional authority, is empowered to arrive at such all encompassing conclusions?

3. In Section VII these two sentences appear:

"It is in the public interest to advance the technology not only for oil shale but for competing sources also. What is called for is a diversified research and development effort by both government and private industry, with the several energy sources viewed as part of an inter-related energy industry."

These vague, all-inclusive words *can* be interpreted at some future date to mean absolutely *anything*! Until they *are* interpreted by some responsible government official, I am unable to comment on them.

I wouldn't think they'd bring any cheer to *any* executive in *any* of our energy industries, however. Their concrete meaning needs to be clarified. What *is* the specific "development effort" and what *is* the specific "research effort" on the part of government that these words are intended to identify?

4. Toward the end of the last paragraph in Section VII this sentence appears: "Improvements of R and D programming within the Department would be desirable."

I have no notion of what this means in specific terms, since it was never discussed at Board meetings.

CONCLUSION

Nothing in our Board's Report *can* be very specific on the exact terms of any contract which the Interior Department might offer private industry to develop our shale-oil resources on government controlled lands. Alternative No. 2 in Section IV comes closest to being fairly specific.

Under the body of this Report as it now stands, however, some future administration *could* impose contract terms for shale-oil development so onerous that private industry would *have* to decline. Government, under this Report as now written, could then claim that it *had* to proceed on its own account due to development being "beyond the reach of private industry."

This is not an imaginary fear in the minds of many business men nor in my own mind. Fuzzy, imprecise language encourages these fears, particularly when it appears from time to time in official documents. This is why I have fought so hard, even if unsuccessfully, for an Interim Report that was specific concerning the *one* major controversy that confronted us.

I can't conceive of any private company making the vast expenditures which would be necessary to extract, refine, transport and sell oil from shale if it feared that somewhere down the road it *might* have to compete with a government dominated shale-oil industry. On reading this Report, the Secretary himself may wish we had been more specific in our recommendations to him—especially in connection with the *one* conflict we Board members have been unable to resolve.

I have tried to be temperate and forthright in my own dissent and I'm sure my Board colleagues will express *their* genuine dissents in the same spirit. Secretary Udall made his own position clear on this matter, however, at a dinner meeting with our Board on last November 30th.

He was quite aware of differing judgments within the Board. He said that he welcomed them; that they helped to sharpen the issues for his consideration. He then asked us to reconvene in mid-January and see how near we could come to a meeting of minds.

But he also said that if there were some areas where differences could not be resolved that he would expect us to state our varying positions temperately but with frankness. I certainly admired his objective approach. I have tried in this statement to stay within the spirit of his guidelines for all of us as Board members.

JOSEPH L. FISHER, *Chairman*.
ORLO E. CHILDS,
BENJAMIN V. COHEN,
JOHN KENNETH GALBRAITH,
H. BYRON MOCK,
MILO PERKINS, *Members*.

THE OIL SHALE ADVISORY BOARD

(By H. Byron Mock*)

When the editors of this publication asked me to comment on the Oil Shale Advisory Board the opportunity and challenge required acceptance. The board had been appointed by Secretary of the Interior Stewart L. Udall and first convened on July 7, 1964. Followers of oil shale problems know the report of the board was submitted in February of 1965 and consisted of twelve pages of report and six separate statements, one by each board member covering an additional twenty-nine pages.¹ Some have labeled it a report with six dissents. To readers, but particularly to the six board members, such a result was frustrating. There were strong differences among the six, but in my opinion a broader area of agreement existed than we had time to hammer out. For this reason I am challenged to show that the report was not six dissents, but actually was six majority opinions.

I. SCOPE

The scope of this article is limited to the deliberations of the Oil Shale Advisory Board. Initially, I had a typical lawyer's irresistible impulse to try to cover the oil shale problems exhaustively, both policy deliberations and legal issues. In view of the able authors who are discussing many of those facets in this publication, the irresistible has been resisted; not entirely perhaps, but I have tried. These comments propose to discuss the three problems suggested by the editors, namely:

1. Provide underlying background of the oil shale controversy;
2. Analyze the various arguments developed within the Oil Shale Advisory Board; and
3. Suggest necessary conclusions for guidelines which might be followed in development of both legislative and administrative policies.

II. BACKGROUND

My interest in oil shale problems dates back to January 1, 1947, the date I assumed duties as the first Bureau of Land Management Regional Administrator for Colorado and Utah. Almost from the first day staff members working on mineral problems called my attention to active oil shale interests frustrated in their efforts to patent oil shale placer claims. In mid or late 1948 then Secretary of the Interior Julius A. Krug traveled to Glenwood Springs, Colorado, on a Denver and Rio Grande train fueled by shale oil. There he met with a large gathering of industry leaders and land or claim owners and gave his blessing to efforts to remove Interior obstacles to oil shale development. Before we left the concluding dinner meeting several delegations had demanded of me some affirmative action to implement the Secretary's stated goals. We tried. Numerous meetings were held with oil shale interests. With particular clarity are the several oil shale sessions at the annual Colorado Mining Congresses in Denver remembered. They were challenging and stimulating meetings. The President's Materials Policy Commission (commonly called the Paley Commission) had published predictions as to oil that the United States would "find it economical to turn increasingly to foreign supplies, and eventually to liquid fuel from shale and coal."² The Commission also stated "... synthetic oil, probably first from shale and later from coal will come into commercial production within a decade or so—perhaps sooner."³ From all these meetings and reports a very basic fact emerged: the problem of unpatented mining claims and other factors contributing to a scattered land ownership pattern made it economically doubtful that either federal or privately owned lands could be developed independently. The Colorado problems were most heavily emphasized, but owners or claimants to oil shale lands in Utah were active too. My jurisdiction did not include Wyoming, so there is no first-hand knowledge of that area.

On September 2, 1952, we had reached the stage where the problems and

¹ Interim Report of the Oil Shale Advisory Board to the Secretary of the Interior, February 1965, transmitted by letter of Chairman, Joseph L. Fisher, February 15, 1965, 43 pp.

² President's Materials Policy Committee, Resources for Freedom, Vol. I, *Foundations for Growth and Security*, p. 107 (June 1952).

³ *Ibid.*, Vol. III, *The Outlook for Energy Sources*, pp. 8-9 (June 1952).

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remedies seemed reasonably clear to us in the field. On that date, over my signature as Regional Administrator, we sent by telegram a "statement submitted for oil shale justification." It is best summarized by quoting the first portion:

"Inadequate ownership information and failure to investigate validity of unpatented claims are obstructing development of an oil shale industry. The ownership pattern is so confused that neither government leasing of shale lands nor development of private holdings is feasible. The U.S. Geological Survey has outlined the bodies of oil shale deposits; the Bureau of Mines has proved the feasibility of extracting oil from shale; oil companies are attempting to block shale holdings, as well as doing experimental work. The President's Materials Policy Commission has indicated that oil shale development is not only inevitable but imminent; but, if the ownership problem is not cleared up in advance, confusion as to ownership can block oil shale development in a period when time may be of the essence.

"The principal oil shale deposits are located in Colorado, Utah, and Wyoming. The area of highest potential industrial development and of highest present interest is in Colorado. The deposits are principally on public lands. Except for those areas subject to mining claims, the government has withdrawn all oil shale lands from access and development. The problem is to determine which lands are subject to valid mining claims and to block private and public holdings.

"The BLM is the agency responsible for solving the problem. Specifically the steps which would be taken are: first, collect data to allow determination of Federal and non-Federal ownership claims. This would involve: (1) obtaining from BLM land office records information to identify mineral ownership retained by U.S. on lands; (2) obtaining from other Federal agencies and county records the record of lands re-acquired by the U.S.; (3) obtaining from BLM Archives, and other files complete record of all withdrawals and restoration orders which affected availability of public land for mineral entry; (4) obtaining from BLM offices records of any other action which segregated lands from mineral entry; and (5) obtaining from county recorder's office record of all unpatented mining claims in the area.

"Second: Clarify land descriptions by (1) as necessary, completing cadastral surveys, either original or re-survey; (2) processing mineral surveys; and (3) verifying location of mining claims by field check of monuments.

"Third: Accelerate processing of claims to patent by (1) comparing claim with withdrawal and other segregation records to determine the validity of claim at time of filing; (2) making field check of discovery and of necessary development work; and (3) issuance of patents.

"Fourth: Cancelling invalid claims, as required.

"Fifth: Blocking public and private oil shale holdings by (1) analyzing and mapping land ownership pattern in shale area; (2) initiating and processing exchanges of mineral lands to achieve solid blocks of holdings under private or public ownership; and

"Sixth: Issuance of leases for shale lands as requested."

Even earlier, by August 22, 1952, Howard J. VanderVeer, then Regional Chief for Minerals, and others of my staff had already prepared, and without undue difficulty persuaded me to sign and submit, a "Proposed Project to Remove Public Land Obstacles to Oil Shale Development." On that date such a proposal, consisting of some seventeen pages and fourteen separate exhibits, was forwarded to the Director of the Bureau of Land Management in Washington, D.C. For various reasons the project was never approved, nor even, so far as my knowledge goes, presented to the Budget Bureau or Congress.

In early 1954, my area of jurisdiction as a Bureau of Land Management field administrator was changed to exclude Colorado, but to add to Utah the States of Idaho, Nevada, and Arizona. Nevertheless, my interest in oil shale continued to be one of active participation as to all states because of membership on the Interior Department Colorado River-Great Basin Field Committee. Service as BLM (Bureau of Land Management) representative on that Committee ran from January, 1947, until my government service ended in February, 1955. The frequent meetings and annual study reports of that Committee placed steadily increasing emphasis on oil shale. There were coordinated presentations by representatives of the Bureau of Mines, U.S. Geological Survey, Bureau of Reclamation, the Bureau of Land Management, and to some extent by other agencies of Interior.⁴ The inevitability of an oil shale industry was not doubted.

⁴E.g., Pacific Southwest Field Committee, Program for the Pacific Southwest Region, 1956-1961, March 1954, p. 3.

Identification of the responsibility of each agency to further such development was our goal. In the analyses extensive consideration was given to the place of oil shale in relation to water power, to oil and gas, to fissionable source materials, and to other energy sources.

Very early I forcibly learned that long before my exposure to oil shale problems in 1947, extensive studies and action programs had been developed in that field.

Passage of the Mineral Leasing Act of 1920⁵ recognized extensive prior mining claim activity, and included language allowing prior located oil shale claims to be perfected thereafter "including discovery." There were the regulations for oil shale leasing issued in the 1920's.⁶ There were the records of relinquishments, also in the early 1920's, made by some mining claimants in return for the promise of preference leases as provided by law.⁷ Some relinquishments had been accepted and at least in some cases recorded; the preference leases to this day have not been issued and conceivably may still be pending. There were the *New York World* articles of about 1928 by a General Land Office Regional Field Examiner crying out against the acquisition of oil shale claims by large oil companies as being improperly monopolistic.⁸ The 1930 Executive Order withdrew and reserved designated shale lands, subject to valid existing rights, for investigations, examinations, and classification.⁹ Then came the Interior Department's abortive efforts to cancel hundreds of oil shale claims on the theory that assessment work had to be kept current on such claims or the claims would become invalid.¹⁰ Next came the two Supreme Court cases repudiating the departmental attempt.¹¹ Later there was the Shale Oil Company ruling wherein the Department "reversed" previous rulings that were contrary to the later Supreme Court ruling.¹² I also recall seeing departmental correspondence indicating no reinstatement need be made of claims previously declared null and void for lack of assessment work. Even more directly indicating the significance of the "reversed" ruling was the subsequent issuance of patents to thousands of acres of claims. Many of these claims were of the class which the Department's Solicitor of 1964 was to rule,¹³ contrary to the actions of contemporary officials and, despite the Supreme Court rulings,¹⁴ were null and void at the time of various administrative decisions of the late 1920's and early 1930's. Probably most impressive to me was the large number of dedicated mining men who had sunk every available dollar into developing and retaining and patenting oil shale claims. Even then sons of those original pioneers were succeeding to the struggle as the original pioneers began to die off. Today only a few of those original dedicated working dreamers still survive. Neither they nor we public officials of those days knew nor suspected that their claims were then null and void for procedural reasons and that the revelation¹⁵ would be forthcoming in 1964, notwithstanding the even then "long established administrative practices."

There is no need here to elaborate further on these matters. They are mentioned as background and because it is always a source of amazement to learn one's efforts are not an initiation of new ideas and actions, but only a continuation and, only a relatively small part of many extensive contributions by others. Here, as many times before and since, it was impressed upon me how essential is a full factual background for sound decisions.

By April of 1963 it was reported that new oil shale regulations would be issued soon. Newspaper articles attributing such statements to responsible Interior officials appeared in August 1963.¹⁶ Some deterring problems seem to

⁵ 41 Stat. 437, 451 (1920) as amended, 30 U.S.C. § 193 (1965).
⁶ Circ. 1220, June 9, 1920 (53 Interior Dec. 127; 43 C.F.R., part 197 (1965).)

⁷ 41 Stat. 445 (1920), 30 U.S.C. § 241 (1965).

⁸ "Statement of Under Secretary of the Interior, John A. Carver, Jr. Before the Senate Committee on Interior and Insular Affairs concerning Oil Shale, May 12, 1965," mimeographed copy, page 4, referring to 1931 hearings of the Senate Committee on Public Lands and Surveys to Senate Resolutions 379, 71st Congress, and to other historical events regarding oil shale.

⁹ Exec. Order No. 5327, April 15, 1930.

¹⁰ The BLM Land Offices of Colorado, Utah, and presumably Wyoming, may still have the land files and references to the land and file designations of the numerous actions initiated.

¹¹ *Ickes v. Virginia Colo. Dev. Corp.*, 295 U.S. 639 (1935); *Wilbur v. Krushnic*, 280 U.S. 306 (1930).

¹² *The Federal Shale Oil Co.*, 55 Interior Dec. 287 (1935).

¹³ *Union Oil Co. of Cal.*, A-29560 (April 17, 1964), 71 Interior Dec. 169 (1964); later supplemented as to "adequacy of service" elements by the Solicitor's Opinion, A-29560-A (July 3, 1965).

¹⁴ Cases cited note 11 *supra*.

¹⁵ *Union Oil Co. of Cal.*, 71 Interior Dec. 169 (1964).

¹⁶ See *e.g.*, Bernick, *Up and Down the Street: Interior Eyes New Rules for Oil Shale*, Salt Lake City Tribune, Aug. 25, 1963.

have arisen and on November 5, 1963, Secretary of the Interior Stewart Udall invited "suggestions from the public at large looking toward formulation of a program to foster the orderly conservation and development of the vast federally owned oil shale deposits in Colorado, Utah and Wyoming."¹⁷ A February 1, 1964, deadline for comments was fixed. Some oil men construed this to mean Interior feared to act without Congressional direction because of possible implications of "Another Teapot Dome Scandal" if lease terms were too generous or a "Scrooge" appellation if conditions imposed restricted development.¹⁸

III. CREATION OF THE OIL SHALE ADVISORY BOARD

The above explains my pleasure at receiving and being able to accept with high hopes the invitation of Secretary of the Interior Stewart L. Udall again to study oil shale problems. The invitation came in his letter of June 4, 1964, asking me "to serve as a member of a special Oil Shale Advisory Board . . . to analyze this whole problem." The problem was stated as being: "If the national interest is to be served, and this resource is to make an optimum long-term contribution to the economic well-being of the nation, the major public policy questions need to be identified and evaluated at the outset."

The Secretary proposed "a study in depth of this whole problem."

IV. FIRST MEETING, JULY 7, 1964

The initial meeting was held in Washington, D.C., on July 7, 1964; members present were:

Orlo E. Childs, President, Colorado School of Mines, Golden, Colorado.

Benjamin V. Cohen, Attorney, Washington, D.C.

Joseph L. Fisher, President, Resources for the Future, Inc., Washington, D.C.

John Kenneth Galbraith, Professor, Harvard University, Cambridge, Mass.

Lt. Gen. (Ret.) James M. Gavin, Chairman of Board, Arthur D. Little, Inc., Cambridge, Mass.

Milo Perkins, Economic Consultant, Tucson, Arizona.

H. Byron Mock, Attorney, Salt Lake City, Utah.¹⁹

General Gavin attended our first meeting, but press of other assignments unfortunately prevented his attending later sessions and he subsequently resigned before the report was prepared. Secretary Udall presided. Also present were then Assistant Secretary for Minerals John M. Kelly, who was the alternate co-chairman from the Department, then Assistant Secretary for Public Lands (now Undersecretary) John A. Carver, Solicitor Frank M. Barry, and a tremendous array of experienced and able men from all parts of the Department. Members of the press were also present. Of major importance in this and all subsequent Board meetings was the presence of Captain Kenneth C. Lovell (USN), head of the Defense Department oil shale program.

Secretary Udall stated that he placed no narrow limits on the areas to be considered by the Board.²⁰ He then outlined "broad areas of policy that have come to the surface in our exploration of this problem."²¹ In abstracted statements they were:

"... First, we must choose those policies which will assure that oil shale development makes its optimum contribution to the Nation's economy over the long term . . .

"Second, careful consideration must be given to the implications of oil shale development on our national and collective security . . .

"Finally, our actions with respect to oil shale must emphasize its conservation, not in the sense of hoarding, but in the creative sense of efficient recovery and wide use . . ."²²

¹⁷ U.S. Dept of the Interior Press Release (P.N. 37328-63), "Oil Shale Development Suggestions Invited by Interior," for release November 5, 1963; Also, 28 Fed. Reg. 11796 (1963).

¹⁸ Bernick, *Up and Down the Street: Oil Shale Potential Starts Brush Fire*, Salt Lake City Tribune, Nov. 10, 1963.

¹⁹ U.S. Dept of the Interior Press Release (P.N. 48827-64), "First Meeting of Oil Shale Advisory Board Set for July 7," for release July 3, 1964.

²⁰ U.S. Dept of the Interior Press Release (P.N. 49030-64), "Opening Statement by Secretary of the Interior Stewart L. Udall at the first meeting of the Oil Shale Advisory Board, Washington, D.C., July 7, 1964," for release July 7, 1964.

²¹ *Ibid.*

²² *Ibid.*

The Secretary emphasized then and throughout our subsequent meetings that he wanted our independent unguided analysis. In later meetings he broadened his remarks to say he did not expect unanimity and welcomed divergent views as a guide to exercising his special responsibility.

Key departmental technical personnel were then presented by Assistant Secretary Kelly and spoke on:

"Future Place of Oil Shale in the Energy Mix," by V. E. McKelvey, of the U.S. Geological Survey.

"Legal Problems," by T. J. Cavanaugh of the Solicitor's Office.

"Technology of Hydrocarbon Fuels," by J. S. Rosenbaum of the Bureau of Mines.

We also were provided prepared statements for background purposes.²³

Subsequently, in our executive session, Secretary Udall asked us to select our own Chairman, and Joseph L. Fisher, one of those headquartered in Washington, was chosen. We then agreed that each would submit to the Chairman an outline of issues which he felt required resolution.²⁴ Responsibility for the numerous details of our work was placed in Eugene W. Standley, Staff Engineer to Assistant Secretary Kelly. He ably absorbed those headaches for us.

Before discussing the development of issues, let us look at our total schedule through filing of our "Interim Report" in February 1965. As noted, material was sent us by Chairmen Fisher and Kelly as well as by Secretary Udall. Before adjourning on July 7 we agreed to meet in September for a visit to the principal oil shale area of Colorado, Utah, and Wyoming.

We gathered via Denver and Grand Junction at Rifle, Colorado, about noon on Sunday, September 13, 1964, and participated briefly in the Open House being held that day by Socony Mobil and Humble and others operating the Anvil Point Oil Shale Research Center at Rifle, Colorado, with the Colorado School of Mines on facilities acquired through the school from the Department of the Interior. We then went to Bureau of Mines facilities and held an afternoon executive session with Secretaries Udall and Kelly and other Interior personnel present. In the evening we returned to Grand Junction. On Monday in a Navy plane the Board viewed the tremendous hydrocarbon energy area of the vicinity. We flew over the Union Oil Company's experimental site; the Anvil Points experiment station in the Naval Oil Shale Reserves No. 1 and No. 3; the sodium prospecting area; Sinclair Oil Company's *in situ* shale oil operation; and another area that is considered favorable for oil shale stripping operations. Proceeding on the extensive tour we flew over the Rangely Oil Field, the Hell's Hole Canyon area where exposures of oil shale in the Green River formation can be

²³ Material supplied before or at the initial meeting included:

- (1) *Background Data for Oil Shale Policy, March 1964*, prepared for Secretary Udall by the Bureau of Mines, Geological Survey and Office of Solicitor, 56 pp.
- (2) *The Oil Shale Policy Problem*, "a synopsis prepared for the opening meeting of the Department of the Interior Oil Shale Advisory Board, July 7, 1964," 46 pp.
- (3) "Summary of Suggestions from the Public for Oil Shale Program," Office of Assistant Secretary—Mineral Resources, April 12, 1964, 38 pp.
- (4) Map: "Oil Shale Deposits of the Piceance Creek Basin in Northwestern Colorado, D. of Int., B. of Mines," revised June 25, 1964.
- (5) Cowan, *A Bibliography of Bureau of Mines Publications on Oil Shale and Shale Oil, 1917-1963*, Revised December 1963, Laramie Petroleum Research Center, H. M. Thorne, Research Director.

²⁴ Data received included:

- (1) Papers presented to the *Western Resources Conference*, Oil Shale Section, Boulder County, Colorado, July 17, 1964, including:
 - (a) Steele, "Basic Research in Appraising the Future of Shale Oil."
 - (b) Landsburg, "Factors in the Long-Range Competitive Setting of Shale Oil."
 - (c) Kelly, "Remarks of John M. Kelly, Assistant Secretary of the Interior—Mineral Resources, Before the Western Resources Conference."
 - (d) Jackson, "Legal, Political, and Administrative Problems in Oil Shale."
- (2) Gooding, "Interdepartmental Energy Study, Research and Development in the Petroleum Industry," September 27, 1963, 7 pp.
- (3) Calhoun, "Leasing for Oil Shale Development on Public Lands," memorandum, July 9, 1964, 9 pp.
- (4) Donnell, *Tertiary Geology and Oil Shale Resources of The Piceance Creek Basin Between the Colorado and White Rivers Northwestern Colorado*, Geological Survey Bull., 1082-L, GPO 1961.
- (5) Quarterly of the Colorado School of Mines, "First Symposium on Oil Shale," Vol. 59, No. 3, July 1964.
- (6) Thorne, Stanfield, Dinneen, and Murphy, *Oil Shale Technology: A Review*, U.S. Dep't of Interior, B. of Mines, Info. Circ. 8216, 1964, 24 pp.

seen, the Bonanza Gilsonite area with its veins of solid hydrocarbon, and the Red Wash Oil Field with production mostly from the Green River Formation. Beyond Vernal, Utah, we flew in the vicinity of the Asphalt Ridge, the White Rocks area with its exposure of oil-impregnated Navajo sandstone, the Sunnyside asphalt deposits with the oil-impregnated sandstone beds in the Green River and Wasatch Formations, and back over Naval Oil Shale Reserve No. 2. En route we passed over several areas of interest, but in general we got a comprehensive view of the vastness of the area and the interrelation not only of oil shale but other sources of energy that are present in the vicinity. A business session was held all afternoon at Rifle and then continued at dinner and afterwards in Glenwood Springs. The following morning, the 15th, we met for two hours and then broke up to follow our respective courses for home. The information provided us was beginning to ferment. The discussions were active and beneficial. Issues began to be drawn.²⁵

The Board had generally agreed that we could not proceed to any final conclusions without an opportunity to hear the nongovernmental advocates of oil shale activity. Accordingly, our next meeting was scheduled to hear those who had information of value for us.²⁶ It was held in Washington, D.C., beginning November 29. We listened to presentations by numerous capable and interested companies and individual spokesmen,²⁷ the pointed comments on many of the issues began to make clear the developing line of the report. The three-day

²⁵ At Rifle, Colorado, talks were given by:

(1) Governor John A. Love, Colorado.

(2) Professor James Gary, Colorado School of Mines, "Technology of In Situ Recovery of Oil from Shale."

At or subsequent to the Rifle meeting, the following data was provided to the Board: (1) "Summary of Oil Shale Resources of the Green River Formation in Colorado, Utah, and Wyoming," U.S.G.C., (undated, but presented Sept. 14, 1964), 14 pp.

(2) "Earlier Oil Shale Proposals" (received by the Department), list of eight proposals (undated, but mailed September 25, 1964), 2 pp.

(3) "Memorandum from the President Addressed to the Heads of the Executive Departments and Agencies on Government Patent Policy with Statement Attached," copy of pp. 18320 and 18321, Cong. Rec., October 10, 1963.

(4) McKelvey, "Economic Problems Attending Oil Shale Development," September 13, 1964, 25 pp.

(5) Cavanaugh, "Disposition of money received under the Mineral Leasing Act," September 8, 1964, 3 pp.

(6) Love, "Remarks by Governor John A. Love before National Oil Shale Advisory Committee," Sept. 12, 1964, 4 pp.

²⁶ U.S. Dept. of the Interior Press Release, P.N. 54892-64, Office of the Secretary, "Oil Shale Advisory Board to meet with Industry," Nov. 13, 1964.

²⁷ Parties represented and documents presented included:

(1) Governor John A. Love of Colorado, and associates, Ted Stockmar, Russell Cameron, Richard Eccles, Jack Tweedy, Frank Cooley and Richard Schmidt: "Statement of John A. Love, Governor of Colorado, to the National Oil Shale Advisory Board, Dec. 1, 1964, 6 pp.; and "Supplementary Written Statement of Governor John A. Love to the Oil Shale Advisory Board," December 1, 1964, 60 pp.

(2) Messrs. O'Brian and Bradley, National Coal Association: "Statement to the Oil Shale Advisory Committee of the Department of the Interior, by Robert E. Lee Hall, Vice-President," (undated), 4 pp.

(3) Curtis Morris, American Gas Association: "Statement Prepared for Oil Shale Advisory Board," December 1, 1964, 6 pp.

(4) Dr. Charles F. Jones and Ray Sloan: a letter from Dr. Charles F. Jones, President, Humble Oil and Refining Company, Dec. 9, 1964, on "Research," with enclosures, 20 pp.

(5) F. W. Williams, Rocky Mountain Oil and Gas Association: letter to Oil Shale Advisory Board, by F. W. McWilliams, Nov. 25, 1964, 2 pp.

(6) Messrs. Hayes, Stones, Brown, and Black, Shell Oil Company: "Statement of Shell Oil Company Representatives before Oil Shale Advisory Board," Nov. 30, 1964, 4 pp.

(7) N. B. Carson and Bruce Grant, Sinclair Oil and Gas Co.: letter to Oil Shale Advisory Board by J. B. Kennedy, President, Nov. 24, 1964, 3 pp.

(8) T. W. Nelson, Dr. Dayton H. Clewell, and Jack E. Earnest, Socony Mobil Oil Co., Inc.: "Opening Statement to Oil Shale Advisory Board by T. W. Nelson," Dec. 1, 1964, 10 pp.

(9) H. I. Koolsbergen, M. M. Winston, and A. F. Lenhart, The Oil Shale Corporation (TOSCO): "Oil Shale Development on Federal Lands, Supplemental Written Statement of the Oil Shale Corporation to the Oil Shale Advisory Board," Nov. 30, 1964, 37 pp.

(10) John R. Pownall and John Allen, Union Oil Company of California: "Statement on Oil Shale Policy Matters to the Oil Shale Advisory Board of the U.S. Dept. of the Interior by John R. Pownall," Dec. 1, 1964, 6 pp.

(11) J. H. Smith, Jr., and John Savage, Valley Landowners Association: exhibits of letters, 12 pp.

meeting ended on a note that we needed at least one more session to bring our thoughts into final form and again try to resolve differences that were appearing.²⁸

The final meeting of the Oil Shale Board was held in Washington, D.C., beginning on Sunday, January 17, 1965, and continuing through the 18th. It was agreed that we had to get the report in by the 1st of February and this was the target we all set out to reach. Chairman Joseph Fisher was having a rough time getting a consensus, but he never ceased to strive toward it.

V. ISSUES

Against the chronological background we now can begin to develop the issues considered by the Board. At the initial meeting and carrying over into the issues proposed later in writing, three principal questions emerged. They were: First, would present opening of federal oil shale lands to development threaten our existing economy; second, is it in the public interest to proceed with developing an oil shale industry; third, can a method be provided for opening federal oil shale lands to development that affords full protection to all interests. The above was my conception of the basic issues, based on preliminary materials supplied to us and on my own personal experience. Each of the Board Members had agreed to send in a statement of his tentative proposals for the subject matter that the Board would consider. Of the five presented and distributed to the Board, mine was far from the most profound.

However, since it was mine, I feel free to use it. As submitted on July 16, 1964, it read:

Questions and subquestions proposed for resolution by the Advisory Group on Oil Shale are:

- I. Does the "public interest" require control of the development of oil shale production?
 - A. What "public interest"?
 1. Defense needs?
 2. International commitments?
 3. National energy requirements?
 4. National economy:
 - a) Industrial development
 - b) Area development
 - c) Protection of current capital investment
 - (1) Investments in the petroleum industry or the energy supplying industries
 - (2) Investment in oil shale investments
 - (a) Realty and deposits
 - (b) Research investment
 - (c) Improvements
 - d) Prevention of waste of oil shale resources
 - e) Prevention of waste of other resources
 - (i.e., mineral, vegetative, space, recreational, etc.)
 - B. Should control be restrictive or incentive or flexible?
 - II. What is the procedural method desirable and possible for federal control of the oil shale resource?
 - A. Availability of federally owned resources for leasing?

[NOTE.—Factual data required with some detail to determine feasibility includes:

 1. What is the true pattern of ownership of the oil shale resources?
 - a) Federal
 - (1) Unencumbered

²⁸ Additional data received at or after the November-December meeting included:

- (1) "Developments at Rifle Oil Shale Plant under Lease Agreement with Colorado School of Mines Research Foundation," (undated, but mailed Dec. 4, 1964), 2 pp.
- (2) East and Gardner, Oil Shale Mining, Rifle, Colorado 1944-56, U.S. Dept of the Interior, B. of Mines Bull. 611, 1964, 163 pp.
- (3) Prien, Denver Research Institute, University of Denver, "Oil Shale—Current Status of U.S. Oil Shale Technology."
- (4) "Shale Oil: Colorado, Utah and Wyoming." Charts and schedules, U.S.G.S., Nov. 30, 1964, 13 pp.
- (5) Stoddard, "Surface Resource Protection—Oil Shale Exploration and Development," prepared by BLM for Oil Shale Advisory Board, (undated, but presented Nov. 29, 1964), 5 pp.

- (2) Subject to doubtful mining claims
 - (3) Subject to probably valid mining claims
 - b) State
 - c) Privately owned
 - (1) Unquestioned fee title
 - (2) Questioned patents
 - (3) Mining claims]
 - B. Clearing of non-federal titles for initiation of development
 - 1. Final decision as to patentability of claims or as to right to develop unpatented claims
 - 2. Exchange program to block federal and non-federal holdings into economically feasible units.
 - C. Other controls of production as to either federal or non-federal holdings, or both
 - 1. Restrictive regulatory agencies, pro-ration, allowables, etc.
 - 2. Incentive
 - a) Title security
 - b) Exchanges
 - c) Opening to leasing
 - d) Tax adjustments
 - III. Other questions arising from above as to timing, responsibility, etc.
- After Co-chairmen Fisher and Kelly and others in Washington had had an opportunity to review all the recommendations a statement of "Issues to be Considered by the Oil Shale Advisory Board" was sent out. (My recollection is that mine reached me about September 3.) Since it shows the developing thought at that stage, it is quoted here as follows:

ISSUES TO BE CONSIDERED BY THE OIL SHALE ADVISORY BOARD

- I. Should the Federal Government take any action at this time to permit development of oil shale on Federal lands?
Oil shale was withdrawn from disposition under the Mineral Leasing Act by Executive Order in 1930.
- * * * * *
- The first task of the Board is to advise whether underlying conditions have so changed since 1930 as to make it advisable to withdraw the Executive Order and permit some form of development of oil shale on Federal lands to proceed.
- II. On the assumption that the Board recommends that development should not proceed now, what is its advice as to the circumstances under which development should proceed later? It is possible for example, that the Board might make development contingent upon an energy supply shortage not now imminent, or on resolution of the problem (and hence extent) of privately owned shale lands, or on private development of a suitable technology and a dynamic competitive industry based on lands now in private ownership.
 - III. Experimental or commercial scale development?
 - A. The Board might recommend that the Government proceed toward development immediately, beginning with an experimental or developmental phase to be undertaken at either Federal or private expense.
 - B. Commercial development poses two broad alternatives:
 - 1. Uncontrolled development
 - 2. Development in which the Federal Government influences to a greater or lesser extent the timing, mode, and rate of development.
- In the event that 1. is adopted, no further basic policy questions would remain.
- In the event that 2. is recommended as the course of action, the Board should give advice as to the extent to which the following should influence Federal oil shale policy:
- a) Impact on other fuels
 - b) Contribution to national economic growth
 - c) Contribution to national security
 - d) Impact on regional economic development
 - e) Impact on international relations

IV. Having provided advice on the foregoing, four problems will remain to be resolved by the Secretary of the Interior, and the Board may wish to offer its advice on one or more. These problems—essentially residual of the broader policy considerations that the Board will deal with in I through III above, are:

- A. What specific programs should be followed to stimulate advances in oil shale technology?
 1. Intramural research
 2. Contract research
 3. Privately financed research
 - a) incentives
- B. What should be the mechanics of private access to the public lands?
 1. Competitive leasing
 2. Noncompetitive leasing
 3. Concession arrangements
 - a) Based on area?
 - b) Based on volume of oil?
- C. What means should the Government use to influence rate and mode of development?
 1. Taxation
 2. Subsidies
 3. Production limitations
 4. Federal participation in earnings
- D. For what purpose should Federal revenues arising from oil shale development be used?
 1. States
 2. Reclamation or other special funds
 3. General receipts

(Mineral Leasing Act of 1920 stipulates 37.5% to States, 52.5% to Reclamation Fund, 10% to general receipts. Some states earmark their shares for special purposes.)

In the beginning two premises had been casually accepted and they operated as an impediment to the initial approach. Those premises were: First, that opening of the federal oil shale reserves could ruin the petroleum industry of the United States, and second, that the oil shale reserves within the United States were so completely controlled by the federal government that there could be no oil shale industry until the federal reserves were opened. By the time of the Rifle meeting in September of 1964, the second of these had been largely repudiated. Discussions of the reserves in Utah and Wyoming showed that there were substantial areas where the Federal Government did not control. This was clear in Utah and implied as to Wyoming. The presence of patented claims in an interspersed fashion was revealed in Utah as well as the presence of state owned school sections in the oil shale area.

Despite this, the presentations by the Department of the Interior personnel continued to be largely focused on the Piceance Basin with particular reference to the heartland of the vast oil shale reserves lying at depth. This heartland as I recall was not fully identified in the early 1950s when the Bureau of Land Management was considering an active program for opening the oil shale lands. Surrounding this heartland is an area of controverted oil shale claims which the federal government has, over the years by one means or another, attempted to invalidate. They are still in controversy. The next ring away from the heartland consists of patented properties lying at lesser depth with less thickness. Running through the heartland and both of the rings are areas of patented oil shale lands where the outcroppings have been revealed and where the parties had proceeded to patent in years past. Even the emphasis on the Piceance Basin heartland did not fail to reveal that the interspersed private holdings could still proceed without waiting for the lifting of the federal withdrawal order which prevented issuances of leases on federally owned resources.

Interestingly enough the result of the revelation that the federal government did not dominate the oil shale industry by withholding its reserves and, therefore, could not dictate the nature of the development completely was to cause an attack on private owners of oil shale lands for not having gone forward with development. The implication was that it made no difference whether the federal government opened the public lands and, therefore, we had no urgency in proceeding. This line of argument increased in force up to the final draft of the

report. At least in my opinion, the presentation that was made in late November an early December when representatives of the private economy appeared before us, completely answered this argument.²⁰ The fear that a government-operated oil shale industry might come into being after private industry had gotten started in the less rich lands was a ghost that kept appearing. The other element was that private capital having been spent in the development and showing the way might give latecomers a chance to pick up federal leases and compete without having the vast initial investments that appear to be necessary. The other factor which was apparent as we saw the pattern of land ownership was that control of segments of federal land is essential to creating an economic block of state and fee lands in practically all areas.

The first premise as to the threat to a domestic petroleum industry was rebutted not only by the testimony of the representatives of the private segment of our economy but also by the facts that were continually presented to us by the Department of the Interior. Those facts revealed that the cost of extracting kerogen from shale was far greater than the cost of extracting petroleum from a well. The initial investments are greater and for a unforeseeable period the margins of profits would be quite low, if they existed at all. The ability to compete against petroleum, domestic or foreign, is of substantial doubt. The need to make vast expenditures in the development of techniques as well as in the acquisition of the reserves and the construction of the plant facilities indicated that only by some sort of consortium could small operators hope to become active in an oil shale industry. This caused some concern.

The interesting result of all the discussions was that on one hand we were being told that the resource was of such tremendous value that no one should be allowed to reap the rich harvest of profits from proceeding; while on the other hand we were told that there was no market for the product and that no one could presently or foreseeably treat the oil shale as a valuable mineral deposit for purposes of discovery under the mining laws. One of the men appearing before us, representing what is probably the major producer of petroleum in the United States, stated emphatically that he felt the oil shale would eventually find its place in the energy complex, that it would be phased in and take its position but that it would not be destructive of the petroleum industry. In reply to a question as to why he felt his company should be "subsidized" by having all or part of the vast oil shale reserves "alienated" to it, he replied, "You may call that a subsidy; I certainly do not." One of the Board members later commented that it was the first time he had heard competitive bidding proposed for subsidies.

The developing of the issues ran into one major problem. The members of the Board, with certain minor exceptions, were men of such tremendous intellectual power that they were able to tackle and resolve problems rapidly. There was no false modesty about ability, but to me, as a bystander, that tremendous intellectual ability tended to carry us past certain common facts that might have justified further exploration. There is always a tendency for intelligence to abhor a vacuum. If no immediate explanation of a phenomenon is present, one is found. The need for broad factual information is particularly important in such an atmosphere. The stress of time, the urgency to complete, the desire to serve, all mitigated against the exhaustive treatment that each would have preferred.

At the Rife discussion two additional issues were emphasized; they had been present before. The first was the problem of the legal interpretations in determining whether unpatented oil shale claims were valid. The Board was not unaware of comments throughout the country that the United States had repudiated the word of its employees over the years by issuing a 1964 opinion which placed a new interpretation on certain past actions of the Department. The Board was asked whether they agreed with the Departmental procedure in these matters. The problem was thoroughly discussed and the conclusion was that the Board was not in a position to pass on the legal arguments and should not involve itself therein. The Board felt it was desirable to make an affirmative statement that the legal aspects of the mining claim problem were not investigated and that we felt it would be presumptuous for us to do so when the matter was one for the normal administrative tribunals and courts to consider. On that basis there was no further discussion of the mining claim legal problems and none

²⁰ See note 27 *supra*.

of us felt that the Department should be condemned or praised for its position on those matters, but that the due procedures should continue.

The second matter emphasized at Rifle was the conservation problem. There was extensive discussion on the need to recognize other values in the areas where oil shale was found. This was of deep concern to all and it appeared in our final report. "Conservation" was a goal with which none disagreed. The exact meaning of the word, however, may not have been the same to all. Because it might offer the greatest possibility of conserving the values other than oil shale, the Board gave a great deal of attention to the extractive process known as *in situ*. This involves retorting the shale in the ground and extracting the liquid at the surface. The problems of disposal of waste, the destruction of the landscape, the filling in of the valleys and all of the related aspects might be avoided by such a process. Two questions would require resolution, however. The first is the economics of the *in situ* process if it is found to be feasible. The second is whether the process would waste any substantial amount of the oil shale by leaving in the ground unrecovered shale oil. If the definition of the word "conservation" includes the avoidance of waste of oil shale itself, then the effort to conserve other values in the area might be outweighed by the need to conserve the oil shale from waste. We never did completely resolve this matter. The details of extraction were far beyond our capacity on the basis of the time and information and training available.

The efforts of every Board member to come to grips with the problem before us was interesting. Continually we by-passed the basic problems and tried to tackle details; continually we had to back up. The question of the method of extraction is one example; the details of leases that might be issued is another; the nature of the research and development that should take place was still another. Incidentally, the term "R & D," meaning research and development, is another example of the need for clear definition. Did the term apply to basic research alone or to applied research as well? Did it cover adopting a tested technique in one area to a new area with varying physical problems? The questions are infinite, even definition may not have resolved them. Some felt "R & D" was a detail; others indicated it might be a goal. Elements of that crept over into our final report.

Another problem continually discussed was concern over whether the federal government should get the maximum return to which it was entitled from the oil shale reserves it owned. This led to one interesting concept of collecting all information that could possibly be obtained before any lease was issued. On this basis the Government could then proceed to issue a lease based upon a fixed number of barrels of oil to be recovered. It took quite a little discussion to get to the heart of this question. It was resolved by pointing out that since no known method of recovery provided 100 per cent efficiency, to issue a lease on the number of barrels would lead to high-grading of the deposit, to the leaving of large amounts of the resource in the ground, to the inability to recover the marginal deposits, and to the destruction of the incentive to the lessee to increase his efficiency and productivity with a resulting increase to the Federal Government of gross receipts from royalties due to a greater recovery of the resource. Perhaps this problem was adequately resolved. Some of us were never sure it had been settled.

The question of who should do research and development continued to flare as an issue throughout all the discussion up to and including the final draft. Some felt that the Government should conduct all the research with its own personnel. Others appeared to feel that it should be done under a Government contract with the results becoming part of the national property to be used by any group that obtained a lease. Others appeared to feel that the Government should concentrate on basic research and leave the applied research to the private segment of our economy. The confusion of terms is obvious. There were heated discussions about the overfocusing of research by having it controlled from one place as contrasted to the greater possibility of a breakthrough by letting everyone have a try by his own method. A tendency to overgeneralize appeared in some of the proposals. The overgeneralization consisted of assuming that all companies were equally advanced or retarded in their development of the art of extracting the oil shale product. Some wondered if those that are behind were not trying to get the resources retained in federal ownership until they could catch up. We never knew. Certainly an overgeneralization was not called for. The companies

are not going to reveal their research secrets; those secrets are part of their assets. Companies may be reluctant to go into a research program where the results go out into the public domain and everyone can start at the same time. They may be willing to cooperate on research but they would not like to be held back in its application until everyone else is equally ready.

The other overgeneralizations that crept in are illustrated by the continued emphasis of the Piceance Basin as though it were typical of all the oil shale reserves. This was not intended but the impression, nevertheless, prevailed. There was no true distinction between deposits that were shallow and deep; between those that are thick or thin; the beautiful areas and waste areas; the solidly blocked ownership patterns and the scattered patterns; the federally dominated areas and the fee or state dominated areas; the presence of water and numerous other matters infinite in their variety.

At this point it should be pointed out that the first preliminary draft of our report was dated November 11 and was received by the Board members prior to their holding the hearing in Washington for the presentation by non-federal parties. Some of us treated this as the format with which we would try to live; others thought that it was subject to a complete revision. At least two of us took the draft and interlined our comments as a complete rewrite without changing the format. Others wrote complete revisions of portions as a suggestion. This was done after we had held our November-December meeting in Washington. At the January meeting it had become clear that we were not going to get a consensus. In order to complete the report our chairman, Joseph Fisher, had come up with the agreement that we would have a consensus and each would have a chance to make his pointed comments or exceptions to that in a footnote if he wished and also each would present his own personal views in a separate statement that would be attached *in toto*.

By the time the report came out it seemed to me that we had resolved two questions. First, there was no public interest that justified holding up an oil shale industry. As a consequence thereof there was no public interest that necessitated indefinite delay of lifting the withdrawal on the federal oil shale lands. The second conclusion was that there were definite public benefits to be achieved from opening the oil shale reserves. Specifically, a letter from the Assistant Secretary of the Navy presented to us by Captain Lovell stated that the Navy felt it was of extreme urgency to know whether oil shale could be developed for use as a reserve by the Navy in time of need. It was obvious that pure research was not enough and that applied research had to be perfected before that question could be answered. We had to have an active oil shale industry before we could know the answers. Apparently we had reached a pretty full agreement on those two points.

The question of method, however, was another problem. We clearly did not approve an uncontrolled release of the federal oil shale reserves; nor did the group approve a government-operated oil shale industry. Some commented that no one had ever proposed a government operation, but in the discussions the point was brought out that just before the 1920 period the Department of Navy had specifically proposed to work and operate the oil reserves at Elk Hills and Buena Vista, California, and Teapot Dome in Wyoming as a government operation. Some felt that there had been recent suggestions in Washington, based on the false premise that the federal government owned all the oil shale reserves, that there be a government corporation patterned after the Satellite Corporation to handle the oil shale reserves. These points are incidental but had to be faced in the process of our consideration.

The method to be used resolved on what was the optimum return to the public interest. Rather naturally this came down to dollars. How could the federal government get the maximum dollar return? The other side of that question is, how could private individuals be prevented from unjust enrichment? We all had the same objective—get the optimum return to the nation—as the Government and as the landlord, both from rental and royalty revenue and from taxes. We shared a common belief that no special favorites should be benefited in the Government's administration of the oil shale reserves. This may have led some to the belief that the oil shale reserves could not be opened up because some might get special benefits. It led others to believe that only by opening them up on a competitive system could special benefits be denied. This deep concern for the

propriety of the operation probably was the greatest problem we had to resolve. Our goals were identical, our proposals of method different.

A complete treatment of our problems which we discussed requires discussion of the ghost of Teapot Dome. This phantom appeared before, during, and after our deliberations. It probably will never entirely go away. It was used to justify government research and to justify "research and development" leases. It was used to justify issuing competitive leases and it was used to justify no leases. A few basic facts about the Teapot Dome controversy may help to bring the problem into perspective.³⁰

The original controversy over the Naval oil shale reserves was not one of scandal but one over what legal rights, if any, the Honolulu Oil Company and others had in the oil reserves set aside for the Navy. The controversy turned on whether the Government could invalidate the rights these parties asserted under prior issued permits or whether those parties would be able to continue their operations. It is interesting to note that Honolulu Oil Company won that fight. The similarity with the present fight of oil shale mining claimants seeking patents and the position of the Government trying to deny them is fascinating. As noted above the Advisory Board did not see fit to pass on the legal problems and yet the parallel with the early oil reserve problem of California is intriguing. It was not until a later period when the Secretary of Interior was accused of granting special favors to his friends on the Naval reserves that had been transferred to his administration that the term "Teapot Dome" became one of complete opprobrium. As time has passed the events of the two periods have become merged into one. Any discussion of opening up Naval reserves or of lifting the withdrawal on other oil shale lands brings back memories of a scandal and all phases of the controversy are blanketed thereunder. It is interesting to note that the scandals of the Teapot Dome period turn on the granting of favoritism for a few in the development of federally owned resources. The proposal of a method by which a few would be allowed to do research and then get a special grant based upon someone's approval of the results may come closer to the problems of Teapot Dome than would the opening of the lands to competitive leasing. Providence would have to protect the federal administrator who decided between two equally belligerent contestants for an oil shale lease on the basis of which the administrator preferred, rather than on some other more objective and less controversial test. At least to me, the taint of Teapot Dome and its application to the oil shale reserves of the Federal Government will best be laid to rest by opening all or part of the Federal oil shale lands to competitive leasing with performance requirements written in that eliminate those who cannot or will not develop the reserve. This does not mean that all should be opened at once but in my opinion some should be. To some the withholding of the federal oil shale reserves from development may be construed to be as great a granting of favors to those who wish to restrict competition in that field as would be the direct issuance of preference to such people. This dilemma is one common to public administrators. To my mind affirmative action is the only solution.

The avenues and by-ways that were explored by the board were infinite. In the final comments, it is obvious that many were not explored by all together, but that some of the board brothers participating in the drafting were drawing on other sources of information. Certainly that was true in my case. Had the time been available to hammer out clean decisions on various factual questions, much of the apparent disagreement might have been eliminated. At our final meeting this was becoming quite apparent. It was not until that period that the board finally adopted and agreed upon a statement of goals and incorporated it in the draft which became the January 21st draft. Perhaps we should have fixed those goals in the beginning but that was not possible. In an effort to fix the points on which we had agreed, I undertook to prepare a statement of facts and to have them adopted by the board. On some we agreed; on some we did not. Consequently, we eliminated the entire list that I proposed. They are, however, of sufficient interest, at least to me, to set them forth as a footnote for con-

³⁰ Recommended reading on Teapot Dome is:
 (1) Bates, *The Origin of Teapot Dome* (Progressives, Parties, and Petroleum, 1909-1921), University of Illinois Press (1963).
 (2) Noggle, *Oil and Politics in the 1920's: Teapot-Dome*, Louisiana State University Press (1962).

sideration by any others who may in the future be delving into the oil shale problem.²¹

VI. CONCLUSIONS

Having participated with my fellow board members physically, orally, and composition-wise, and having shared their deep interest in oil shale, their unflagging concern for the public interest, and the pressures and frustrations, I must state basic truths to you who may read these comments:

²¹ The proposals were:

- (1) Oil shale development is not presently a matter of major concern in the over-all national needs for energy.
- (2) Efforts to develop a viable oil shale industry as an alternate source of national energy supplies is in the national interest.
- (3) Immediate efforts to develop an oil shale industry do not pose a serious threat to that portion of our national economy represented by the oil industry and other industries supplying our energy requirements.
- (4) Parties interested in oil shale development are in various stages of progress toward commencement of a commercial oil shale industry.
- (5) The federal government controls some 75% of the total acreage and some 85% of the known reserves of oil shale. An additional 5% of both acreage and reserves may be controlled by the federal government depending on the outcome of pending controversy over the ownership of unpatented mining claims. The remaining ownership of acreage and reserves is in private ownership with some in the states of Wyoming and Utah in state ownership.
- (6) At least one company and perhaps others are proceeding to develop known oil shale reserves not in private ownership.
- (7) Withdrawing or maintaining the withdrawal of federal reserves from development will not necessarily prevent development of an oil shale industry by those able to acquire private and state lands.
- (8) Withholding the federal reserves from access creates a favored position for oil shale development in the hands of the relatively few holders of non-federal lands.
- (9) Numerous companies or groups of investors are demonstrating substantial interest and making major investments in efforts to develop an oil shale industry.
- (10) Withholding federal lands will not prevent such development, but will restrict competition and may reduce the probabilities of a breakthrough into successful and economically feasible development.
- (11) The federal oil shale reserves could be attractive for speculative investment, as contrasted to development investment.
- (12) The lands involved have values other than those for oil shale. Conservation standards for protection against waste of the oil shale resource itself, for the protection of surface, other mineral values, scenic values, and other values, and protection against pollution and other damages have not been established.
- (13) The federal government can act contractually to achieve such conservation standards as to federal lands but must cooperate with state and local governments and private owners to achieve them as to the remaining area.
- (14) If federal government wholly or in part withholds access to the federally owned reserves for development, the federal government will not be participating in the development of conservation standards and inducements to orderly development that is in the best national, regional, and local interests.
- (15) The present stage of oil shale development indicates that continuing adjustment and improvement in the techniques of extraction and processing for the oil shale industry is needed to achieve and maintain an economically feasible place in the national energy picture for oil shale.
- (16) Development of standards for protection of values other than oil shale requires substantial cooperative efforts by all segments of our society—federal, states, and private. The establishment of such standards that can be observed within economically feasible limits will have major effect on the development of an oil shale industry.
- (17) Other considerations, such as depletion and quotas and other factors will also affect the development of an oil shale industry. Such factors are believed to be beyond the scope of this board's mission.
- (18) The proceeds received by the federal government from its owned oil shale reserves are distributed under the terms of the Mineral Leasing Act of 1920 on the basis of 37½% to the state of origin, 52½% to the reclamation fund, and 10% to the General Fund in the U.S. Treasury. The large sums which may be received in the future, costs of administration and possible costs of protecting other public interests in the area without unduly burdening the oil shale industry with such public benefit expenses may require review of the propriety of the above distribution of receipts. Again, this is a problem noted for consideration, but one considered to be beyond the scope of this board's mission.
- (19) The current controversy over the ownership of unpatented mining claims creates a situation that allows neither federal nor private—and in some cases state—control of the controverted lands for purposes of development. Until such controversies are resolved the lack of necessary certainty of title in federal or non-federal ownership retards development.
- (20) The federal government is receiving no present income either in royalties, rentals, or as tax base from its oil shale reserves and has increasing continuing expenses in their management.
- (21) Withholding oil shale reserves from access or granting of access without making such access open to competition can be expected to evoke accusations of "favoritism" against responsible federal officials.

1. Secretary Udall refused to guide us to pre-determined conclusions. He invited and incited diverse opinions. He deliberately forced us to open any new problems we found necessary.

2. It is remarkable that as much was accomplished as was. The delineations of basic conflicting philosophies was an accomplishment. Reconciliation of them might have been possible with more time.

3. Had members of this Board been willing to lend their names to a staff study prepared for them, a less controversial report might have resulted. Not one would have done so, and Secretary Udall and Assistant Secretary Kelly were not parties to any pressures in that direction.

4. Joseph Fisher, in the unenviable job of chairman, did a tremendous job in gaining as much consensus as was obtained. Without his firm conference guidance and unflagging efforts to reduce our discussions to written form acceptable to us, there might have been no consensus report at all.

5. All of us, and probably the chairman most of all, would have welcomed several "head-knocking" sessions, beginning where we ended, to factor out facts and issues.

6. Such sessions could have hammered out "findings-of-fact" and "definitions." Such "definitions" clearly stated would have minimized differences arising from words apparently common but actually pregnant with different meaning to each of us. Such "findings-of-fact" would have restricted the reliance and emphasis by each of us on the beliefs and half-truths not agreed upon but drawn upon from the widely divergent backgrounds of the six board members. Without these common grounds of understanding and the limits fixed by them, no agreement could be reached.

7. No group could have been more unalterably dedicated to our national public interest, nor more concerned with an effort to be fair toward all segments of our society. We differed on methods, on some factual conclusions, on time-tables of urgency—they were honest differences. No one could be more privileged than was I in testing my principles and beliefs against such fine minds, splendid gentlemen, and principled Americans. My appreciation of the need for and the importance of the democratic process is reaffirmed; my respect for those with whom I differ is enhanced; my desire to continue exploring those differences in search of fundamental truths is burning even more brightly.

8. But even had we been able to "head-knock" in to common recommendation, we still were only "Advisory." The burden of decision and the full responsibility rest directly on the Secretary of the Interior. His concerns are multitude, the pressures of a many-faceted public interest unending. As one of us six majority opinion writers said to Stewart Udall after the report had been made public: "Each of us had definite views on what you should do, but not one of us was certain that he would follow that advice were he sitting in your place."

Consistent with all those conclusions and specifically without necessarily dissenting from the last, my mind turns to an old and wise sailor's remark: "Even the best pilot and navigator can not steer a drifting ship." My views in the separate "majority" opinion remain the same:

No proven public interest precludes development. There is a national urgency requiring that we commence. To wait too long may waste all or part of the vast oil shale reserves as its place in energy history is passed by and we go on to other energy sources. Ample precedents for protecting all aspects of public interest are available and workable. Failing to give private capital a chance to try is wasting three great resources: The ingenuity of private enterprise, revenue from rentals and from the tax base of new capital assets, and possibly the shale resource itself."

Development of a viable oil shale industry faces many problems. Until we face them, those problems will not be solved. Objections to every proposed solution will continue to proliferate. Positive losses from delay are far more damaging to our national interests than possible losses from mistakes in proceeding.

The Oil Shale Advisory Board had to stop before it finished. At least it found that opening federal oil shale reserves need not be detrimental to the national interests and that keeping them locked up may be.

U.S. SENATE,
COMMITTEE ON APPROPRIATIONS,
Washington, D.C., September 14, 1967.

Senator HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee, New Senate Office Building,
Washington, D.C.

DEAR MR. CHAIRMAN: I am taking this opportunity to comment on the oil shale resource problem that is currently being considered by your committee.

Three facts stand out in any examination of these oil shale deposits.

First, the vast extent of the resource. According to the Geological Survey the deposits contain 170 trillion barrels of oil. Estimates of recoverable oil range to high figure of 2.6 trillion barrels worth more than \$5 trillion.

Second, 85% of the resource is owned by the American people through their government.

Third, we appear to know virtually nothing about the full extent or value of this precious resource and very little about development costs, problems and processes.

For these reasons I urge your Committee to prohibit the Secretary of the Interior from proceeding with plans to lease this shale oil land to private industry for research and development. Any attempt by the Secretary to draft final regulations in view of the many unanswered questions that remain would be akin to the efforts of a blind man in a darkened room to read an unknown language.

I have seen no evidence to indicate that it is essential, or even desirable to develop these shale oil reserves with the haste exemplified by the Secretary of the Interior's decision to issue draft regulations. Naturally the Secretary is under severe pressures from within the oil industry to proceed with a development plan. But it is up to your Committee, Mr. Chairman, to put a brake on the present headlong rush to lease this land.

This Committee and the Congress, not the Interior Department, should make the significant decisions as to how this extraordinarily valuable property should be handled. The stakes are too high, the public interest is too transcendent, the pressures are too great, and the questions are too many to permit these decisions to be left to administrative discretion.

It would be irresponsible of me to suggest this course to your Committee without presenting some sort of alternative that would protect the interests of my Wisconsin constituents and the people of his country, which we all represent. I am currently drafting legislation which would reassert the legitimate rights of the people in this public treasure trove. I only wish I could have come before your Committee with a final version of the bill for discussion during the current hearings. However I can say that it will deal with the multiple problems that will be encountered in developing this resource by setting up a mechanism to:

Determine the extent and value of the resources, including not only the oil shale but aluminum, sodium and other minerals as well.

Evaluate the impact vast residues from the processing of the shale could have on our natural environment and how to avert this type of pollution.

Investigate the adequacy of existing technology to get the extraction job done as well as the type of research that needs to be undertaken and by whom, and decide on the disposition to be made of the results of this research.

Clear title to disputed claims to much of the shale oil land.

Decide on the most orderly, fairest way of allocating these shale oil reserves with particular reference to encouraging competition within the industry as well as protecting the rights of the smaller, independent oil companies.

Set the level of payment the Federal government should receive from the extraction of oil and other minerals from the shale as well as the proper distribution of these payments among the states within which the deposits are located, the remaining states, and the Federal government.

None of these questions have been satisfactorily answered. Until they are, this Committee should not permit these deposits to be leased. And the Congress has a unique responsibility to assume the mantle of leadership in seeing that these many problems are approached by the Federal government in an orderly, sensible fashion. We cannot refuse this stewardship of the public trust.

A further problem which must concern the Congress, although it does not come within the jurisdiction of your Committee is the question of the depletion allowance for oil shale. Should it be the 15% allowance presently permitted for shale, the 27½% figure used for oil or some other, lower amount reflecting the fact that exploration expenses are virtually nonexistent where oil shale is concerned?

Finally I would add that there is enough oil shale land in private hands—15%—for the industry to begin answering some of the above questions itself. If it wishes to join with the Federal government in a creative partnership to find answers, that is all to the good. But until the government is in a position to give reasonable answers to all of these questions, I feel we cannot in all conscience lease further shale oil land to private interests.

I hope that I will have an opportunity to discuss my proposal with you and the members of your Committee, Mr. Chairman, after it has been worked into final form and introduced on the floor of the Senate. But above all I urge you and your Committee, Mr. Chairman, to bring to a halt the present hasty administrative effort to distribute this shale oil land.

Sincerely,

WILLIAM PROXMIER,
U.S. Senator.

Senator Moss. Our first witness this morning will be Mr. John G. Winger, vice president, Energy Resources Division, the Chase Manhattan Bank, New York. We are happy to have you with us, Mr. Winger. You may proceed.

STATEMENT OF JOHN G. WINGER, VICE PRESIDENT, ENERGY RESOURCES DIVISION, THE CHASE MANHATTAN BANK, NEW YORK, N.Y.

Mr. WINGER. It is an honor for me to be here today, Mr. Chairman. I think, as we all recognize, the energy industry ranks among the very largest of the economic activities of the Nation, and because of the great importance of the energy industry the bank I represent created 31 years ago a special division to deal with the bank's relations with these various energy industries. It was necessary for the management of the bank to have a continuous flow of information relating to these industries, if it were going to carry on its affairs in the most efficient manner.

We have, in addition, customers from every factor of the economy coming to the bank and seeking information about the energy industries.

Just to cite one example, a steel company wanted to make a survey of 25 percent of their market. Some companies will come to us and seek information about the future prospects for forward planning in good fashion.

As I understand it, I am to present to the committee some of the information we have generated for business purposes. Unfortunately, the nature of this information does not lend itself to a written report. Therefore, we are going to utilize, today, visual aids. Experience has taught us that we can communicate far more information within a given period of time in that manner, so that this story will appear on the screen in a series of slides, each being in the nature of a building block, each slide adding a part to the picture. Some of this material may raise questions in your minds, so I will say that often a succeeding chart will tend to clear up that question.

Now, if you can give me a moment, I shall turn this on and proceed.

Senator Moss. You may proceed, Mr. Winger. I know we keep those slides in the files of the committee; so, if we want to examine them at a later date it will be possible for the full committee to do so.

Mr. WINGER. We can make available to the committee either a set of the slides or a reproduction of the slides. I would suggest that reproduction might be more useful for your purposes.

Senator Moss. If you would agree to do that, we would appreciate it.

Mr. WINGER. We can do that; yes, sir.

It has been established that in all of the progressive nations of the world there is a close relationship between the economic and the energy requirements of the nation. We are going to deal this morning with the energy markets of the United States and the prospects that we see for the energy markets for the decade which will end in 1975.

You see chart No. 1, which shows the population growth in the United States from 1920 up to the present time, and the decade expected a continued growth in the past, even during the very difficult years when we went through the great depression the continuous growth projected to the end of the decade. This projection is not our own. It is the consensus of the thinking of a number of population experts and includes the projections of a growth census. We would label this as conservative projection.

You can see that we have divided the population on this chart into two groups, those under and over age 15. Everyone who will be over 15 by 1975 will have already been born, and it is almost a mathematical certainty that we will have this number at the end of this decade. We cannot, of course, be quite so sure about those under 15.

With a growing population we then have indicated a growing economy necessary to satisfy the needs for goods and services, and a growing economy is going to require growing quantities of energy. So, we have here evidence of an ingredient for growth.

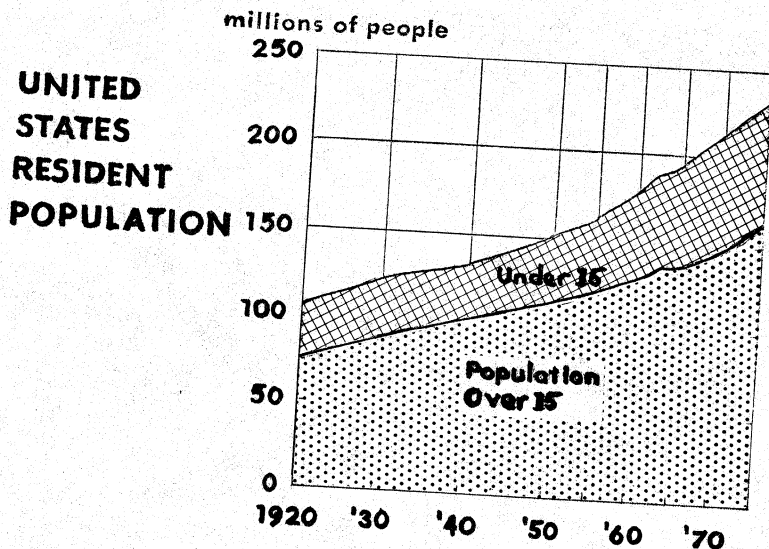


CHART 1

Of greater importance than the overall expansion of the population is the change in the various age groups that constitute the total population. [Chart 2.]

If we go back to 1930 and measure the number of children under the age of 5, we find that there was a decline which lasted throughout the decade of the 1930's. It lasted, in fact, until this Nation became involved in World War II. We know, from hindsight, that it was a difficult economic situation, and that the difficult economic circumstances of that period brought about this decline in the birth rate.

After we became involved in the war, the birth rate accelerated rapidly.

In 1955, we had this many people in this age bracket, and in early 1965 there were twice as many, but what happened back at that time was reflected 20 years later when the same young children became young adults in the age groups of 20 to 24. You can see the decline existing throughout the 1950's, turning around in 1962, and beginning a rapid increase.

Here we are showing in the scale mathematically what lies ahead. This has an impact upon our economy, because this is the age of new family formulation. The average age for man is 22 and for the female it is only 20. We know, of course, that when two young people join in marriage their demands for goods and services increase quite substantially. So that the decline in the birth rate back in the 1930's, really constituted a brake upon economic growth in the 1950's, and this in turn reduced the growth of the Nation's energy requirements.

If we look to the future we can see reason for optimism in respect to the expansion of our economic activity and, in turn, the growing energy requirements.

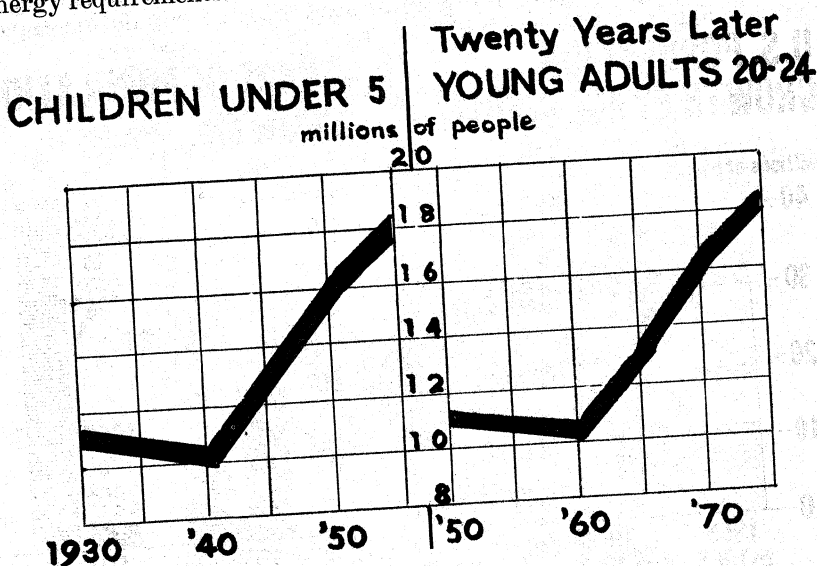


CHART 2

We can see this better when we examine what is happening to other age groups shown on chart 3.

On the left-hand side of the screen, the growth of our population in this 10-year period ended in 1965 with almost 30 million people, and the growth by age groups is indicated by the colored band of the bars—under 15, 15 to 20, 20 to 35, and all over 35.

In the current decade we can expect a growth of about 31 million people, but the expansion by age groups will be substantially different: not so many under 15 or not so many in the 15-to-20 bracket, but a great many more in the 20-to-30 bracket, and then, again, not so many over 35. This is going to have a great influence upon economic activity.

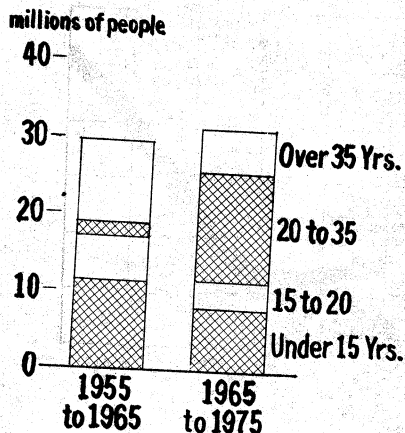
Let us consider, first, the effect of the 15-to-20 bracket. This group of people is very important to basic industries, the automotive and the petroleum industries. These people are important, because this is the time in their lives when they first obtain a driver's license, and we know today that young people in that age group will drive every time they can get their hands on a car, which is more frequently than was the case when I was in that age bracket.

We can see that in the current decade the expansion of this group is not going to be as large as it was in the past decade, and this tells us something about what we should expect in terms of energy requirements.

The most important group by far is the 20-to-35-bracket group, indicated by the red bar. These people are important, because they account for a major proportion of the overall expenditure for goods and services. This is when they are establishing their homes, and equipping them and spending for a wide range of purposes.

With the growth of this group in the past decade amounting to 1.5 million, representing only 5 percent of the total population expan-

U.S. POPULATION GROWTH BY AGE GROUP



SHARE OF POPULATION GROWTH

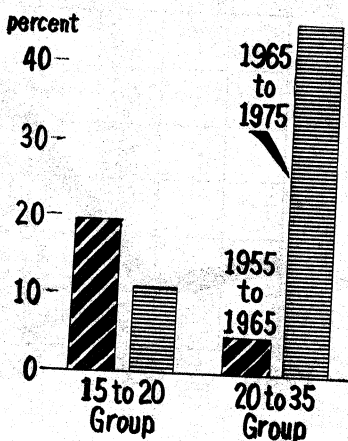


CHART 3

sion, in the current decade we can expect an expansion 10 times as large, or almost 15 million people, and this will constitute as much as 45 percent of the total population growth.

I think that we can see readily that this going into effect will affect the growth of our economic activity, because of what we can expect in terms of the demand upon the capital markets, and, of course, most importantly, what we should expect in terms of energy requirements.

On chart 4 we have traced the expansion of energy use on a per capita basis, and we express these energy requirements in terms of barrels-of-oil equivalent. Experience has taught us that this is the most meaningful unit of measurement. No one can visualize a B.t.u., nor a kilowatt-hour of electricity. I doubt if we could see a thousand cubic feet of gas. We might see a ton of coal, but everyone can get a mental picture of a barrel. So, we have used this unit of measurement and will continue to use it in the rest of this showing.

In the first 5-year period indicated on this chart, 1950-55, the per capita consumption of energy increased by the equivalent of three barrels of oil. Then, in the following 5 years, when we were experiencing the full effect of the decline in birth rate, back in the 1930's, the energy consumption rose by less than one-half as much, not even a barrel and a half.

Then, in the next 5-year period, as we pulled away from the influence of the decline in birth rate and took on the effect of an accelerating birth rate, you can see that the energy consumption per capita rose by a much larger amount, more than 5½ barrels per person.

Our studies indicate to us that it is reasonable to expect that, during the next two 5-year periods, an increase of about one barrel per person per year, or five barrels for each of these 5-year periods.

On the right-hand side of this chart we have traced the overall per capita consumption expressed in oil equivalent. Starting out in 1950

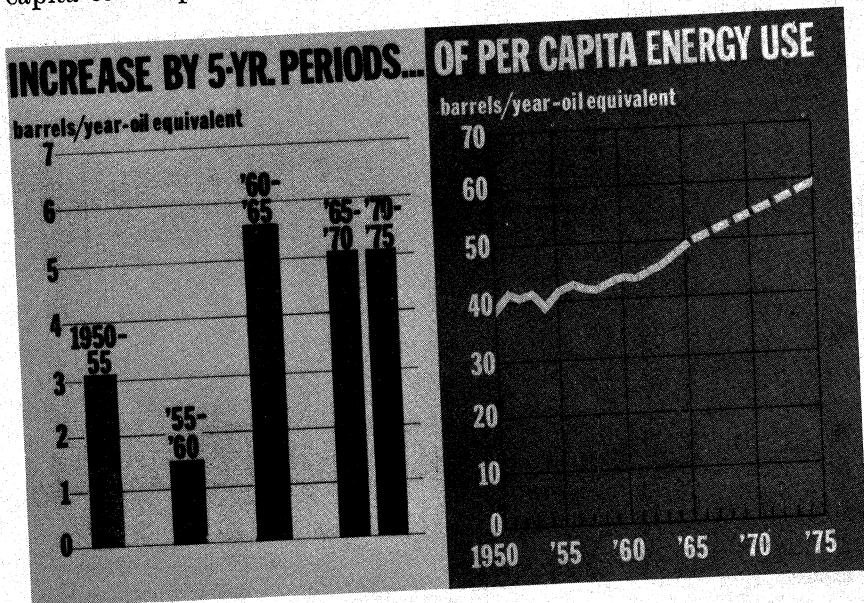


CHART 4

the consumption was slightly less than the equivalent of 40 barrels of oil. There was a period of slow growth which was reflecting the decline in birth rate of the 1930's.

This chart reflects the 1954 business recession, another one in 1958, and then, as the influence of the accelerating birth rate came into the picture, you can see the sharper upturn in per capita energy requirements; that is, in 1965 almost 50 barrels per person. To give you a perspective, this compares with a per capita consumption in Western Europe of 15 barrels per person, barely one-third as much as we consume in this Nation. Here is the projection which our studies indicate is a reasonable expectation.

Still another way of measuring energy consumption and, again, in oil equivalents, in 1950 we consumed in this Nation the equivalent of slightly more than 15 million barrels of oil per day. In 1965, our consumption had increased to approximately 26 million barrels of oil equivalent, and our studies indicate that we should expect a consumption equal to about 38 million barrels a day by 1975. [Chart 5.]

The per annum growth rate in the past decade averaged 3.25 percent, and we can expect approximately 3.5 percent in the current decade.

Still another measurement is the accumulative consumption for an entire 10-year period. We consumed in the past decade the equivalent of 80 billion barrels of oil, and we can expect in the next 10-year period to consume that much and approximately 40 percent more.

As measured in oil equivalent, as you can see, this is indeed a tremendous volume of energy. We cannot, of course, conclude that all of these sources of energy are going to share equally in this growth. To determine which will grow faster and which slower, we need to know a great deal more about the energy markets.

Seeking answers to find out where the people are, we divided the United States up into five areas. These are the five petroleum dis-

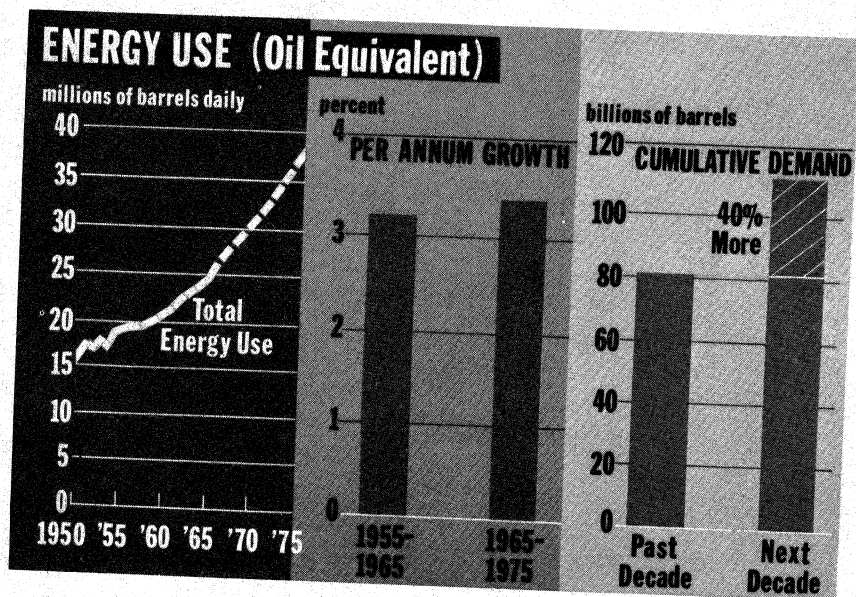


CHART 5

tricts which were established during World War II for logistic purposes and have been continued up to the present time. [Chart 6.]

It is not surprising to find that the largest concentration of people is on the eastern seaboard, 39 percent. In this central division we find 33 percent. So, almost three-fourths of our people are located in these two regions. There are 12 percent on the gulf coast and a similar amount, 13 percent on the west coast. And in the Rocky Mountain region there are 3 percent.

The figures in the white circles measure the per capita consumption of energy in each of these regions, and the lowest is on the east coast. It is equal to 38 barrels per person, and it is the highest on the gulf coast, almost twice as much, equal to 74 barrels per person. The reason it is so high in the gulf coast region is for various reasons:

First, there is a large concentration of most of the refineries which are located down there, and the refinery is an industrial consumer of energy.

Secondly, there is a large complex of petrochemical facilities, and when we consider the energy market, we think of any end use of an energy—raw material—not only the energy that is utilized for purposes of combustion.

A third reason for the high consumption in the gulf coast area is this: You take advantage of the exceedingly low price of natural gas. And to take advantage of that, several industrial activities have been attracted to the area, aluminum being an example.

In the north central region, the consumption is equal to 50 barrels. That parallels the national average, around 51 barrels in the Rocky Mountains and 43 on the west coast.

Now, chart 7 shows the consumption of energy on the same basis. Our single largest energy market is in the north central area, 35 percent of the national average, and 32 percent on the east coast. So these

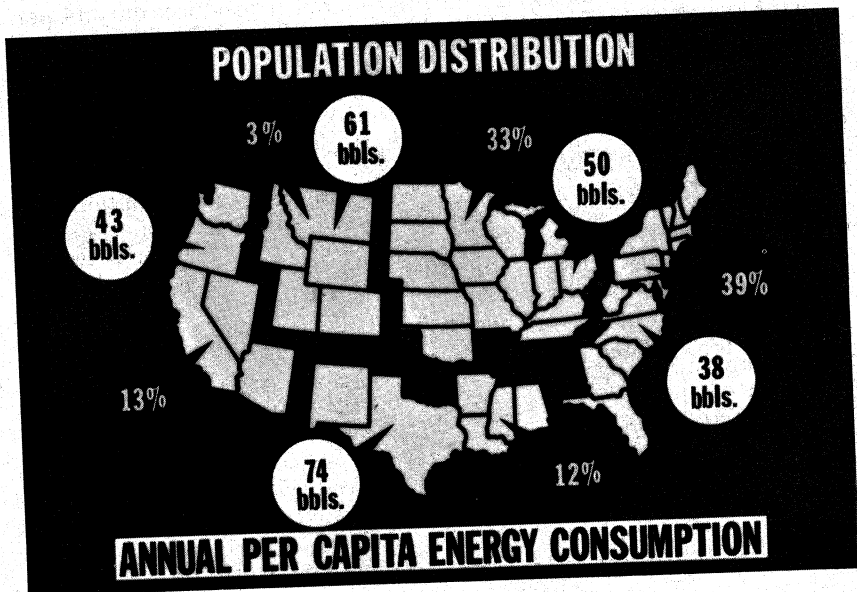


CHART 6

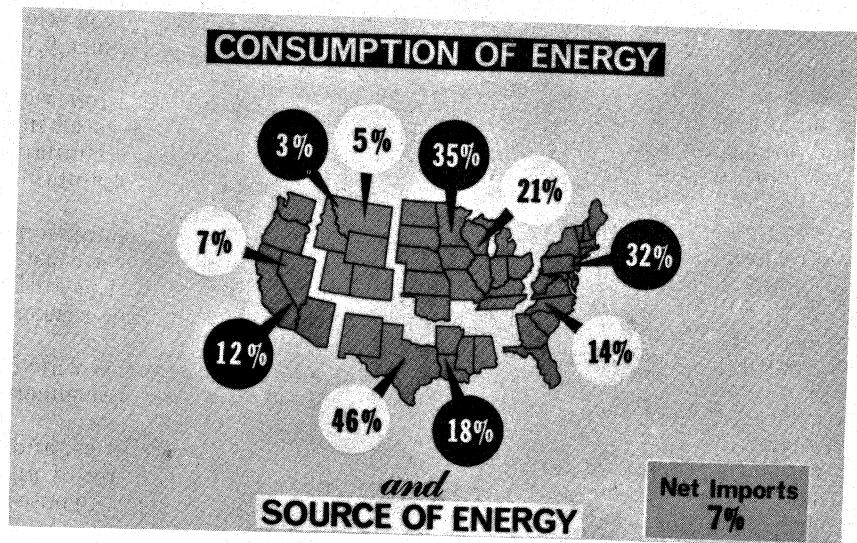


CHART 7

two areas account for two-thirds of the Nation's energy consumption. About 17 percent of consumption is in the gulf coast area, 12 percent on the west coast, and 3 percent in the Rocky Mountain region. This is important to keep in mind as we consider the prospects for oil shale.

The figures in the circles measure the proportion of national energy consumption that is produced within the borders of each region. Using the east coast as an example, as I have just mentioned, this accounts for 32 percent of the national consumption but it produces only 14 percent of the energy consumed in the Nation. The difference between these two figures measures the energy deficit.

Each of the areas colored red are deficit energy areas, and obviously, those colored blue are surplus areas, producing more than they consume.

The figures in the circles will add to 93 percent and the remaining 7 percent of our energy supply is provided in the form of imports.

The energy deficit on the west coast is a great deal smaller, as you can see, than the deficit on the east coast, or that in the north central region. And, this, too, is an important factor to consider when we are involved with questions relating to shale.

Now, as to the petroleum market. On the same basis chart 8 shows the market for the petroleum hydrocarbons or natural gas. The largest market, again, is found in the north central region, 31 percent; 30 percent is on the east coast; 23 percent in the South; 13 percent on the west coast and 3 percent in the Rocky Mountain region.

Here, again, the figures in the circles measure the proportion of natural petroleum consumption that is produced within the borders of each area, and, again, we can see the deficit areas and the surplus areas.

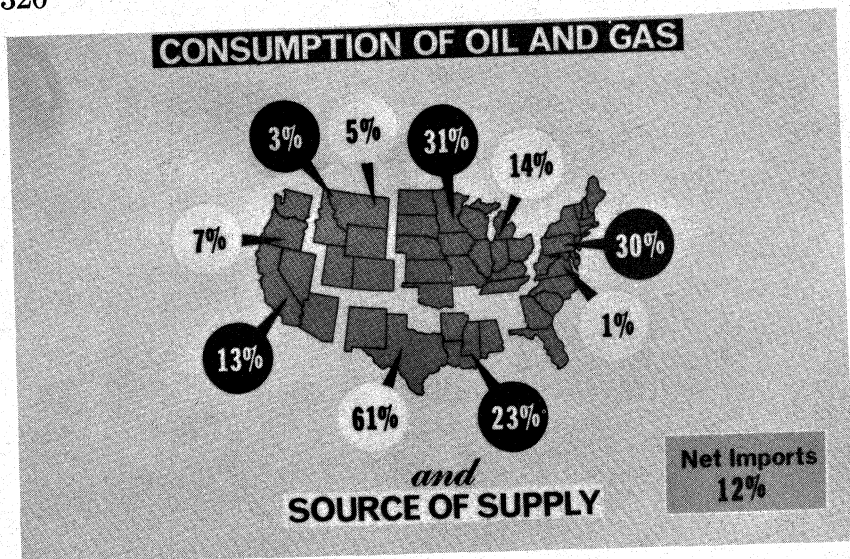


CHART 8

Oil shale, in moving to market, conceivably might move to the west coast where there is a deficit equal to 6 percentage points, or it might move to the central area, where there is a much larger deficit, or it might move to the east coast where the petroleum deficit is as large as 29 percentage points. We must consider, of course, in this movement, the economics of transportation. It can be stated generally that the cost of moving liquid petroleum by land is substantially greater than moving by water. The oil shale must move a considerable distance by land because of its location before it meets any market. And in order to overcome the disadvantage of the higher transportation costs, there must be other cost factors in relation to other energy sources that are lower. The same thing would apply if we were to consider the oil in Canada as a potential source of liquid petroleum to satisfy the U.S. market. In this case, net imports account for 12 percent of the total petroleum supply.

The largest use of petroleum is represented by industry and commerce, 39 percent in total; transportation, which includes all forms of transportation, and agriculture account for 25 percent of the consumption. The residential market, which is primarily space heating, is the smallest, 15 percent. And the primary energy required by the electric utilities for generating purposes accounts for 21 percent. [Chart 9.]

We can look at this market in a little different fashion on chart 10. Of the electricity produced by the utilities, 30 percent moves to the residential market and 7 percent to the industrial-commercial market. Therefore, considering the total consumption of energy by these markets, both direct and indirect, we find industry and commerce accounting for 53 percent of all energy consumption in the Nation; residential use, 22 percent, and transportation, again 25 percent.

Chart 11 shows us the primary energy sources for each of these geographical regions.

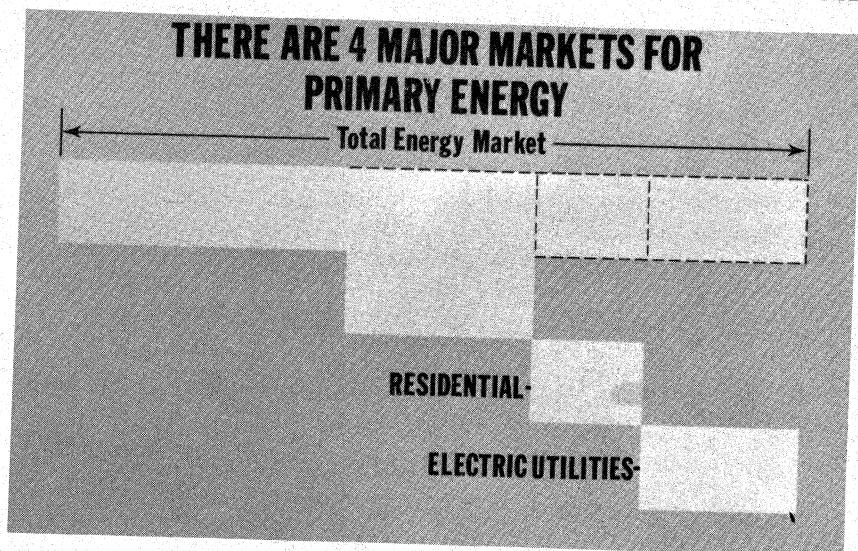


CHART 9

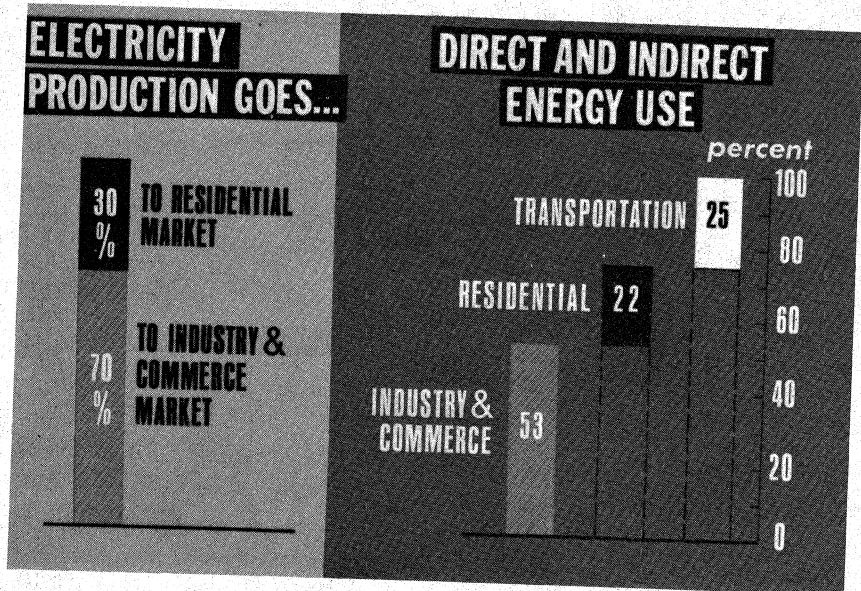


CHART 10

The largest market, the north central, in 1965, was 8.6 million barrels a day. Oil had the largest share of that market, 38 percent; coal was not far behind with 33 percent; the gas market was 28 percent, and water was 1 percent.

Oil also leads in the next largest market, the east coast, where it had more than one-half, and coal was a little bit more than a quarter. In the Rocky Mountain area oil led with one-half of the market and

gas had a little bit more than one-third. Natural gas has the lead down in the gulf coast area, with 55 percent of the market.

In the transportation market, we have the petroleum records. There is much less competition within that market, and we have investigated this market to see what the situation is.

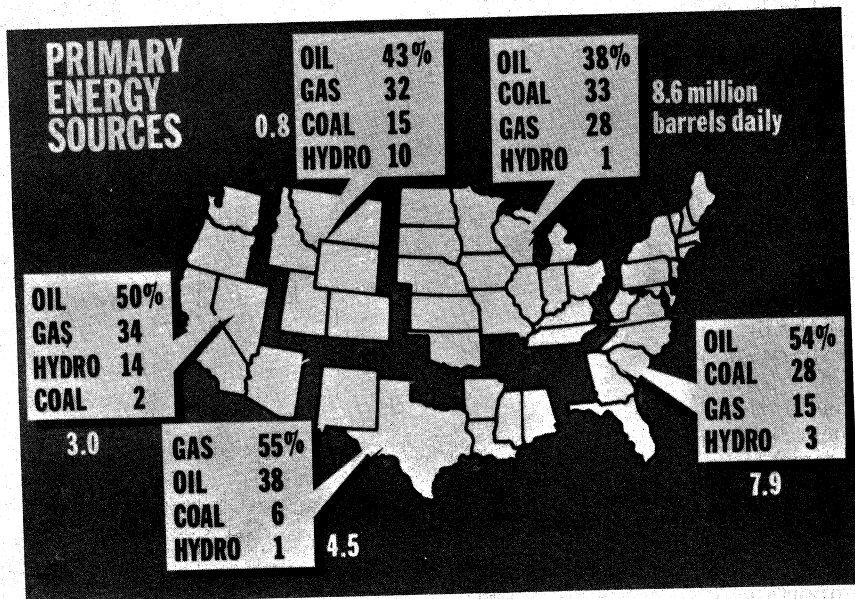


CHART 11

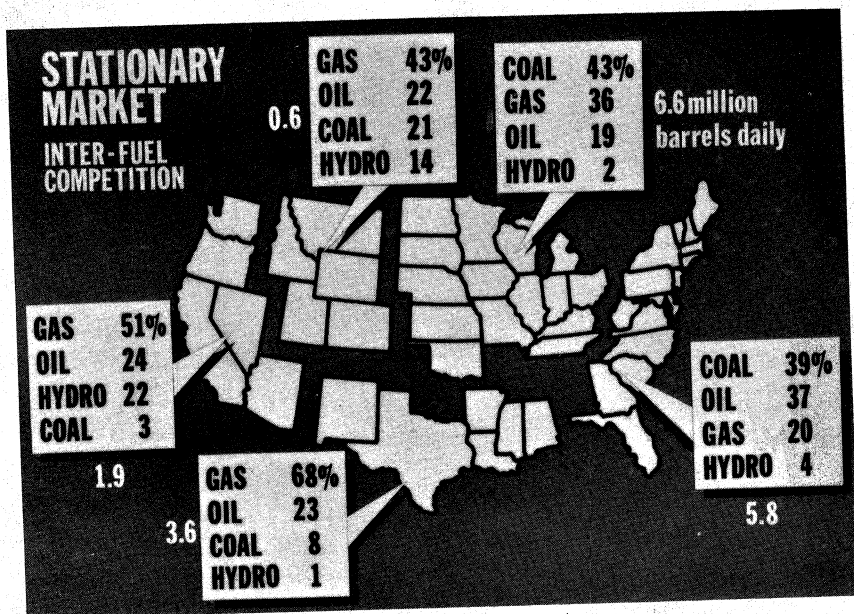


CHART 12

Chart 12 shows the stationary market. Everything that does not move. And this market is 75 percent of all energy consumption.

Backing up for a moment, we find that oil leads in four of our geographical markets and gas leads in one market, but when we take away the transportation market we find that oil leads in none. Coal is the leader in the largest market, 43 percent; gas in second place, and oil is in third place.

Coal leads in the second with 39 percent; oil, in second place, with 37 percent, and natural gas leads in the other three with as much as 68 percent down in the gulf coast area; 51 percent on the west coast, and 43 percent in the Rocky Mountain region.

To look at each of these markets to see what has been happening, let us look at chart 13.

On the left, the growth for 1950-65. Slow growth for a period of several years, reflecting the population factors I have already spoken about.

In the center panel, the per capita consumption of energy in this market had no growth for more than a decade. You can see the effects of the business recession. Then, in the last few years the chart shows a sharp increase in the consumption in this market.

On the right-hand side, starting in 1950, coal was the dominant fuel in this market, but coal has been steadily displaced, the displacement being represented largely by natural gas. Oil was growing for a time, but more recently has moved into a stage of decline.

The electric utilities' market is, by far, the fastest growing of all of our energy markets. Chart 14 shows that it has more than doubled in this span of years and the per capita consumption has risen rapidly, too. There is an explanation for this rapid growth. First, but of lesser importance, all of us are, as individuals and on a business basis, consuming more electricity, but the major reason for this strong growth

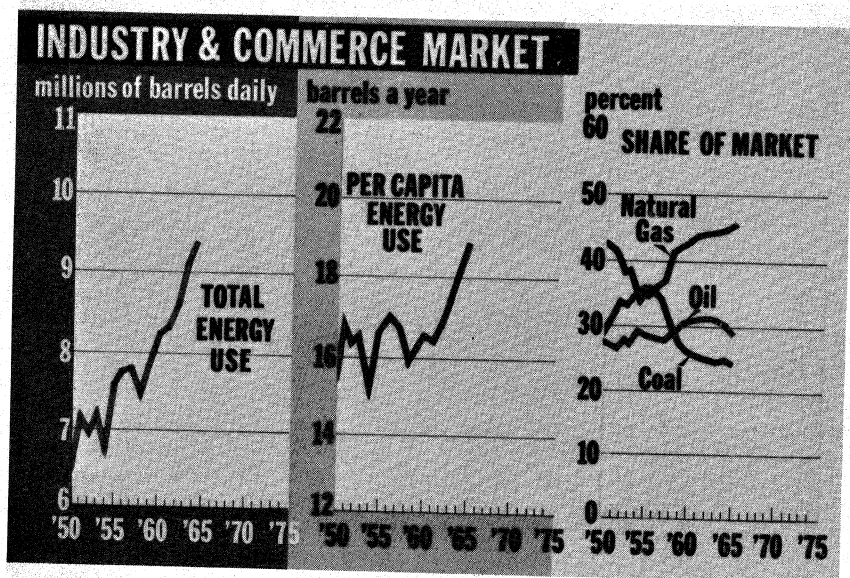


CHART 13

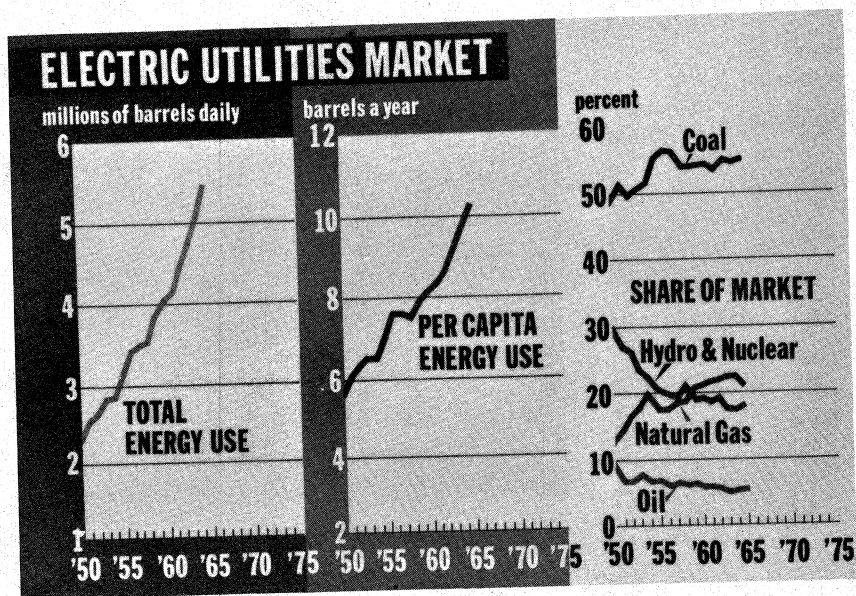


CHART 14

reflects a shift in the energy consumption patterns of industry and commerce.

We can go into the past and find many industrial activities that consumed energy directly, burning it under a boiler to raise steam and then using the steam for generating electricity or the production of power or for processing, but, in more recent times, many of these industrial activities have ceased this practice and have turned, instead, to electricity purchased from the electric utility. So, it is this shift that has brought about the very strong growth in this market. This is the one major market in which coal has the leading position, currently about 55 percent of the overall market. Hydro and nuclear, primarily hydro, had almost one-third of the market in 1950, but the proportion has dropped below 20 percent now, even though the installed capacity has almost doubled in this period of years.

The fastest growing source of energy for this market is natural gas, indicated by the trend line. Oil has never been very important in this market. As you can see it has steadily declined throughout this period of years.

The residential market, the smallest, is also the slowest growing of all of the markets. In this 15-year period, it increased by approximately 25 percent. There was very little growth in the per capita consumption. The growth that occurred has reflected, primarily, changes in weather conditions; the winters on the average were so much colder in the second half of this period than in the first half. [Chart 15.]

As recently as 1950, coal was still the leading source for this market, having almost one-half.

You see what happened to coal in the interim, being displaced for a time by both oil and natural gas; but, more recently, as gas became available, the oil moved into a state of decline while gas moved ahead.

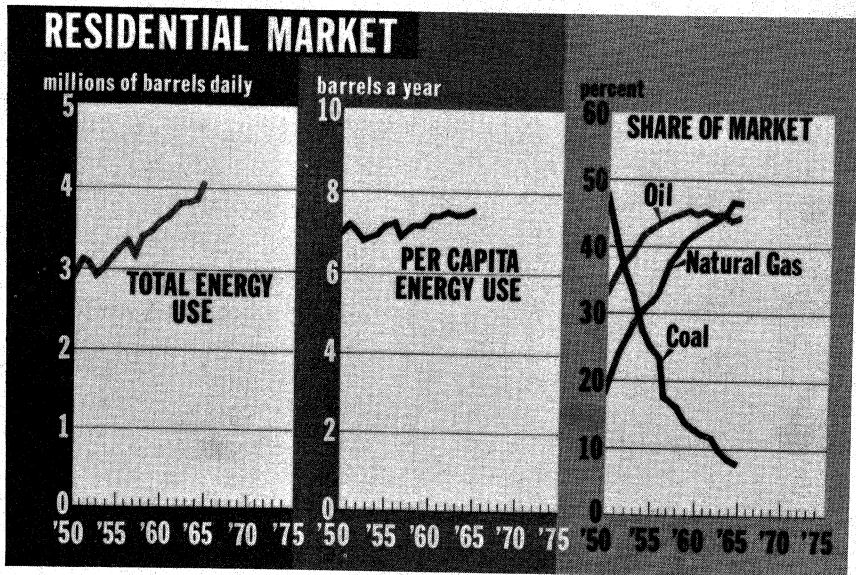


CHART 15

The attractiveness of petroleum hydrocarbons to this market has enabled them to displace coal.

The transportation market has a strong growth for most of the past and in the most recent period it has steadily moved up. The per capita consumption has slowed, however, during the period shown on chart 16. That slowdown reflected the practices that I spoke about, and it also was because of the advent of the compact car, which saw a 30-percent decline in the average horsepower of automobiles on the road.

We are again, in a trend of higher horsepower, and this is reflected in the upturn of per capita consumption. But the major factor is the population changes that I spoke about earlier.

I also mentioned that oil, or more properly petroleum liquids, now has all of the transportation market upon the completion of the railroad's dieselization program.

The four markets I have been talking about are shown on chart 17. The darker portion of the bars shows the size of each of these markets in 1965, and the lighter portions show what we anticipate by 1975.

The size of the market is indicated by the scale at the top, reflected in millions of barrels daily, or their oil equivalent.

The largest growth, as you can see, is expected in the electric utilities market, and this is most significant, because the electric utilities pay, by far, the smallest price for their energy, and this may very well create some economic problems in the future.

The second largest growth is in the transportation area; next in industry and commerce, and, last, residential.

And the reason why the industrial-commercial market growth is not larger is simply because commerce is buying so much energy in the form of electricity from the electric utilities. Since the electric utilities are going to show the greatest growth, let us examine the prospects for that market.

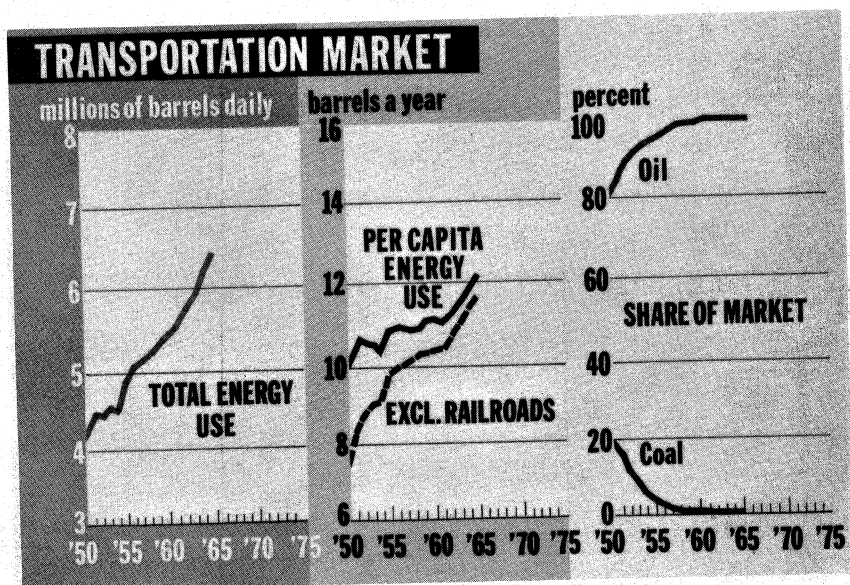


CHART 16

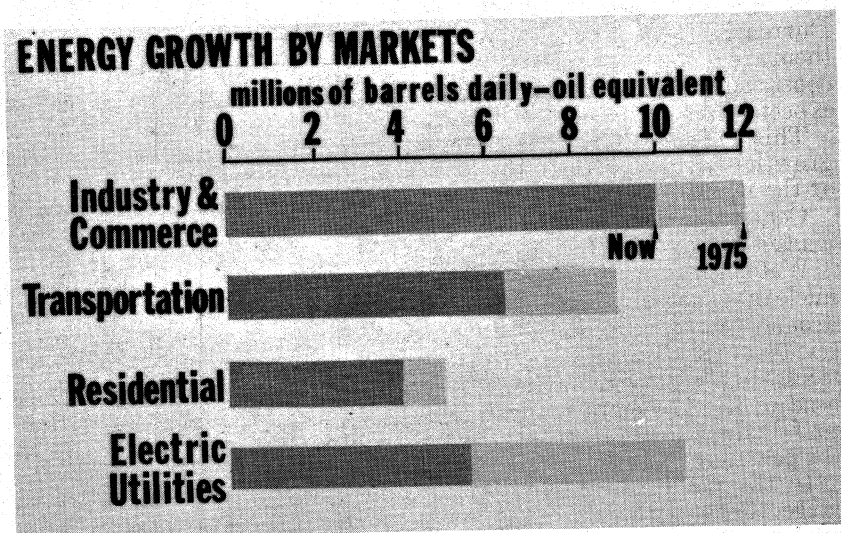


CHART 17

On chart 18 we see the five geographical regions again. And the size of the market in 1965 is indicated by the dark portion and the growth expected by 1975 is shown by the light portion of the bars.

We will look at each market by itself.

First, the east coast. The overall expansion in the decade is expected to be equivalent of 1,600,000 barrels per day. In other words, it would take that much oil to generate the amount of electricity required. Everyone who has been involved has been amazed by the number of orders by utilities in 1966 for unclear-powered generating stations,

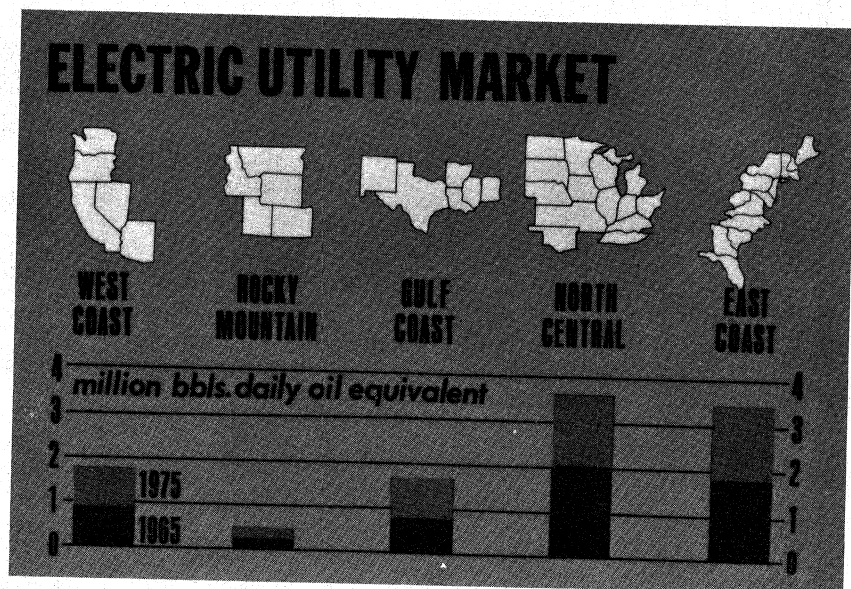


CHART 18

Currently, there are 80 orders that have been placed, and all but 14 of them are firm orders. If we presume that all of these nuclear plants are constructed and come on stream, this is the impact that we should expect.

This energy would capture the largest portion of the expected growth of this market on the east coast. It would move from 1 percent of the market in 1965 to 32 percent by 1975. [Chart 19.]

Coal would enjoy the next largest growth, but coal's share of the market would fall from 67 percent to 43 percent.

Waterpower would be involved here, too. The efficiency of the nuclear generating station requires that it operate continuously around the clock and around the calendar. Not nearly as much electricity is required in certain parts of the 24-hour period, nights particularly, and the extra electricity that is produced at night can be used to pump water to an elevated site. Then the water is permitted to fall during the daytime and generate more electricity, satisfying the peak requirements.

In the north central area, the overall growth would be about as large, but coal is expected to get the larger share of the growth and nuclear power would be in second place. This comes about as the result of the location of the plants that have been contracted for by the electric utilities. [Chart 20.]

Gas would enjoy some growth; a slight growth for water, and none, in fact, for oil.

In the gulf coast area, the overall growth is indicated on chart 21. In this case, natural gas is expected to get the larger share of growth. There will be some nuclear energy involved. These are the TVA installations, and some in Arkansas. Coal will get some growth, which is the Alabama coal. A little growth for water, but none for oil.

We have seen three major markets, and the growth being made by three energy sources. It is important, of course, that we know these things if we are going to consider the prospects for new sources of energy, such as oil shale.

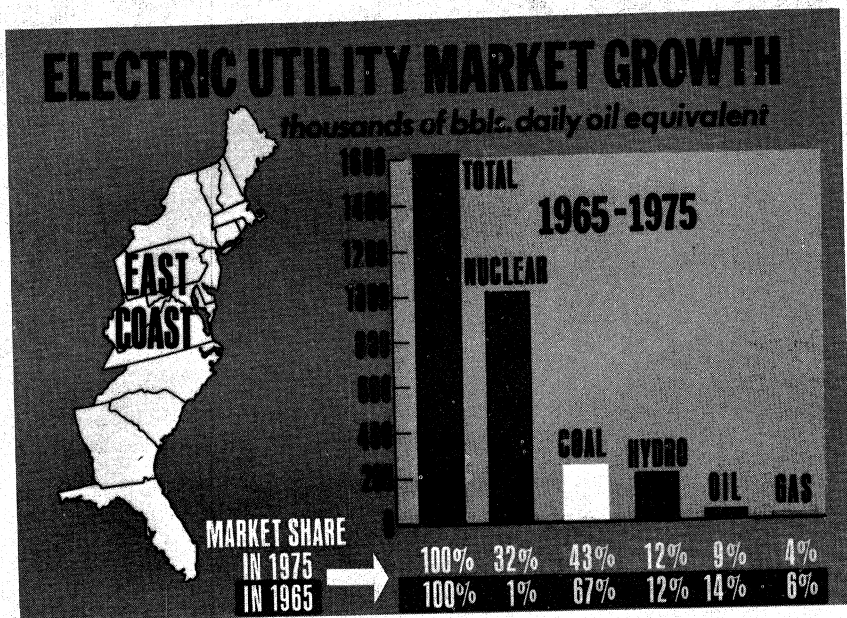


CHART 19

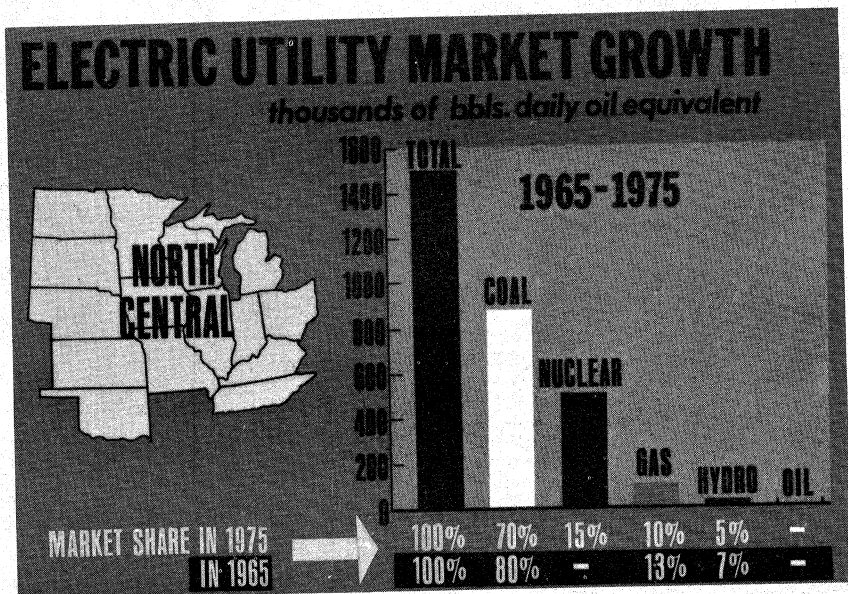


CHART 20

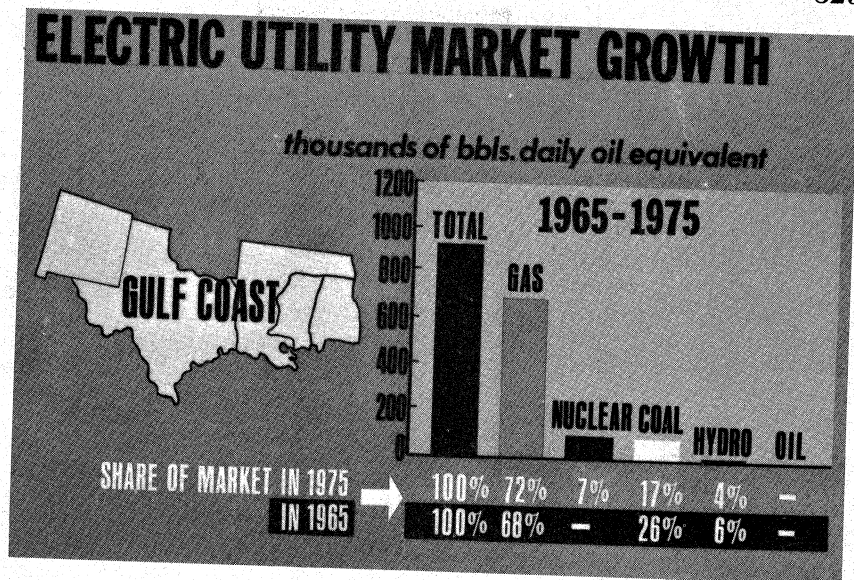


CHART 21

In the Rocky Mountain region itself, a much smaller market of course, coal is expected to get one-half of the growth there, and water most of the other half. There is one nuclear plant involved in the future. A small growth for gas, and, again, none for oil. [Chart 22.]

On the west coast the pattern is more like that which we foresee for the east coast, with nuclear energy accounting for the major part of the overall growth; natural gas in second place, and water in third place, then coal, and then a decline in prospects for oil. [Chart 23.]

Adding these together we see on chart 24 that the expansion of energy requirements in this market would be equal to more than 5 million barrels of oil a day, with nuclear powerplants providing the larger share, equaling somewhat more than 2 million barrels; then, coal; then, gas; then, water, and, then, lastly, oil.

For the most part, this morning I am talking about the prospects for 1975, but, in respect to nuclear energy, it is more meaningful to go 5 years farther up, to 1980. If all of the nuclear plants that are now in the picture do come into existence, the energy represented by these nuclear plants in 1980 would be equal to 5 million barrels of oil a day, more than twice as much as we can expect in 1975, and this, indeed, is going to offer an effect upon our energy market.

The share of the electric utility market in 1975 is shown on chart 25. Coal would have the largest increase, according to our studies, then nuclear energy, then natural gas, then water power, and then oil with only 3 percent.

The prospects for the industrial-commercial markets are shown on chart 26, and we concede that in this case the largest growth is expected on the gulf coast.

We will look at these markets one at a time.

On the east coast, gas will get about one-half of the expected growth; then, oil; then, coal. [Chart 27.]

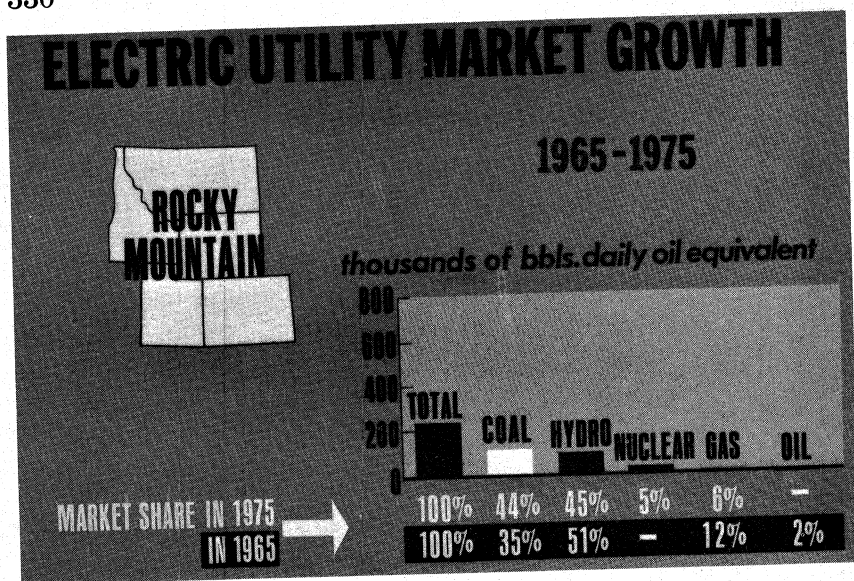


CHART 22

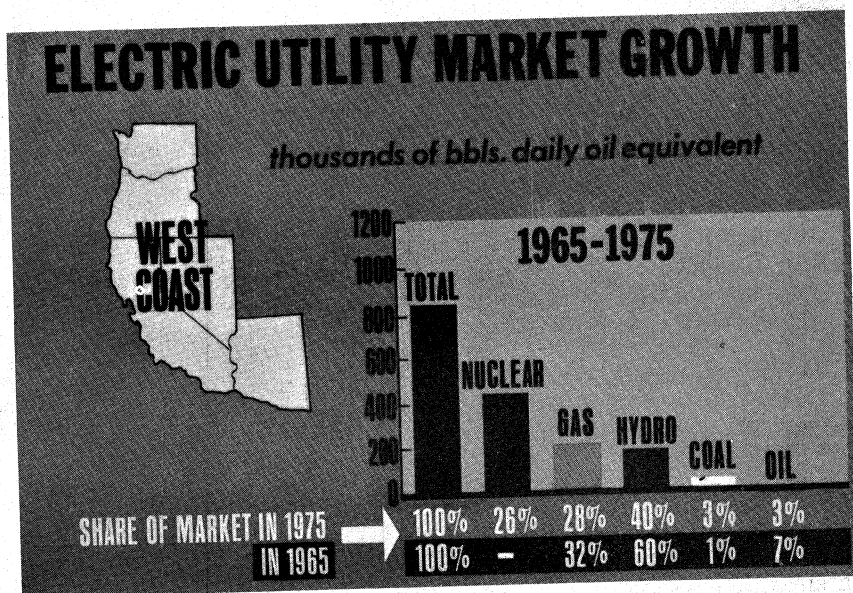


CHART 23

For the growth expected, in the north central region, gas would exceed the expansion of the overall market, gas being substituted increasingly for coal; it being a more attractive market to some industrial consumers. And, of course, the price of natural gas entering the market is exceedingly low in respect to the other sources of energy. This is one of the results of the Federal regulation of gas moving in

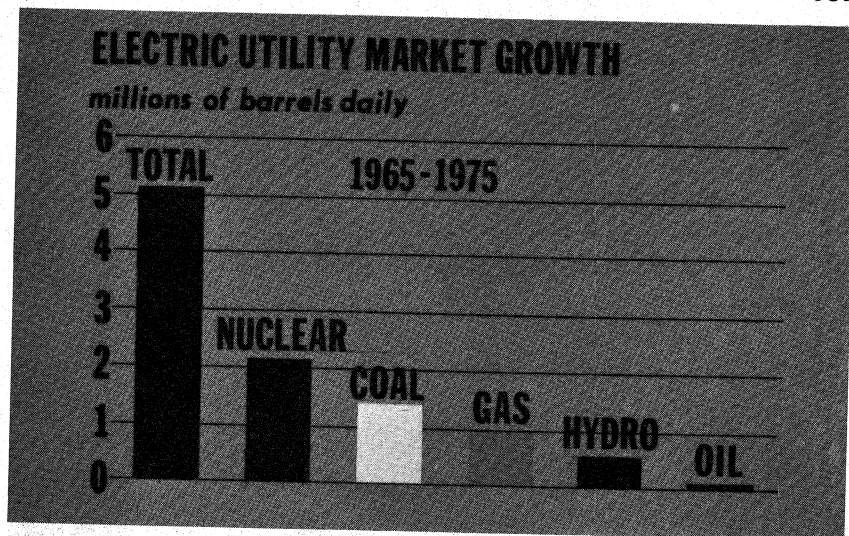


CHART 24

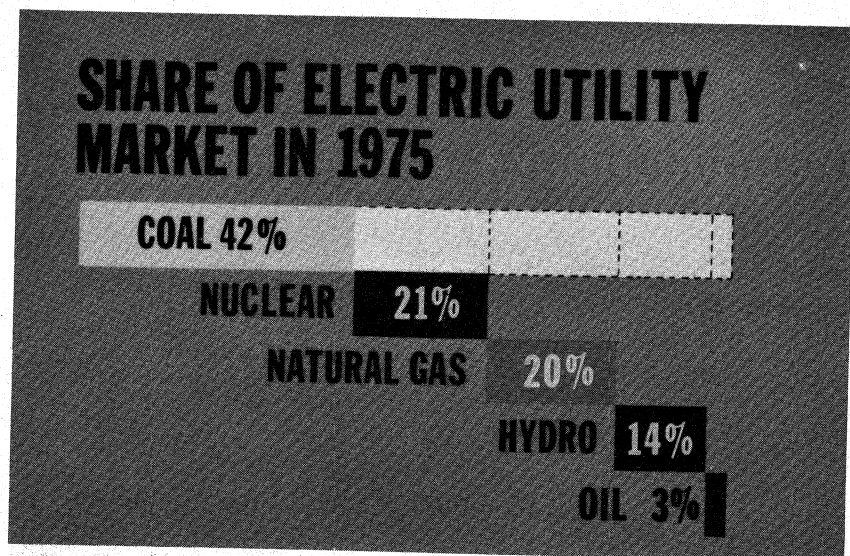


CHART 25

interstate commerce, and this regulation, of course, is reflected in the intrastate price charged for gas. [Chart 28.]

In the gulf coast area, oil is expected to get the larger share of the growth, and there are various reasons for this, but the most important is the use of oil as a petrochemical substance. Gas would get the next largest share. [Chart 29.]

In the Rocky Mountain region, gas would get most of the growth that we can foresee there, a little bit going to oil as shown on chart 30.

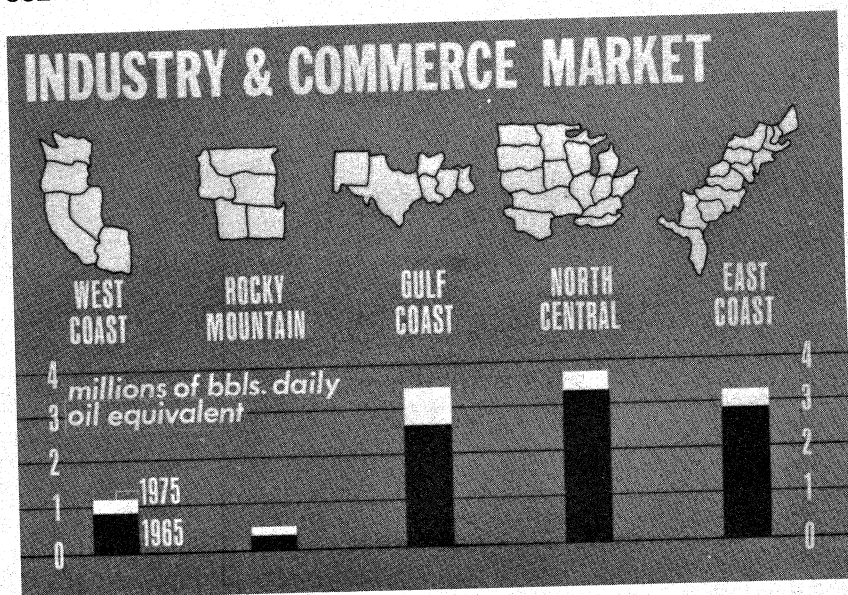


CHART 26

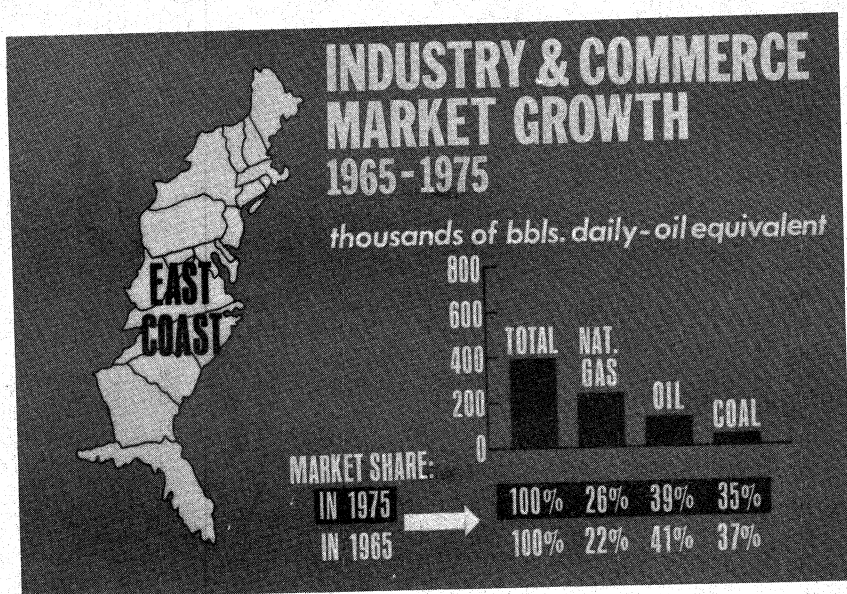


CHART 27

On the west coast, again, gas is expected to capture most of the growth, leaving very little for oil as illustrated by chart 31.

Of the total expansion in the industrial-commercial market, equal to more than 2 million barrels of oil per day, gas is expected to get more than three-fourths of that total growth, with oil losing ground.

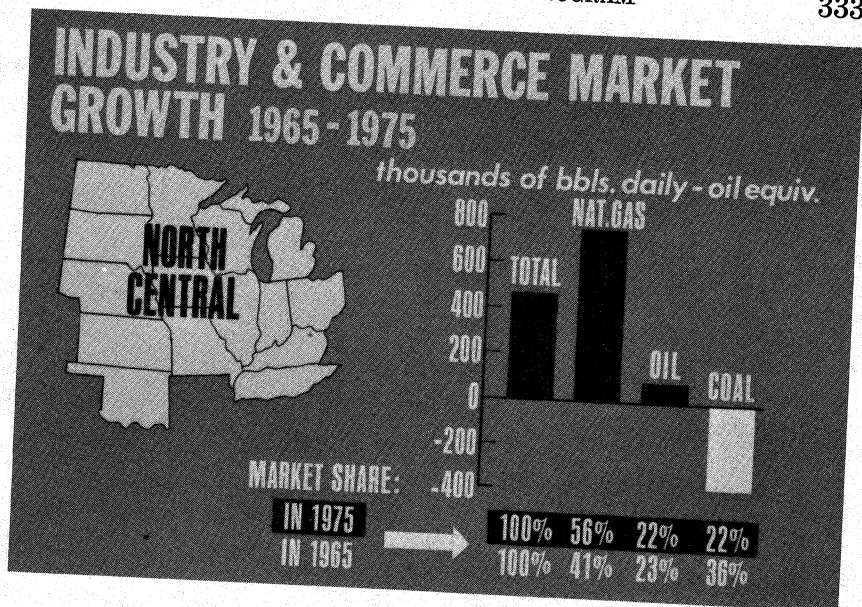


CHART 28

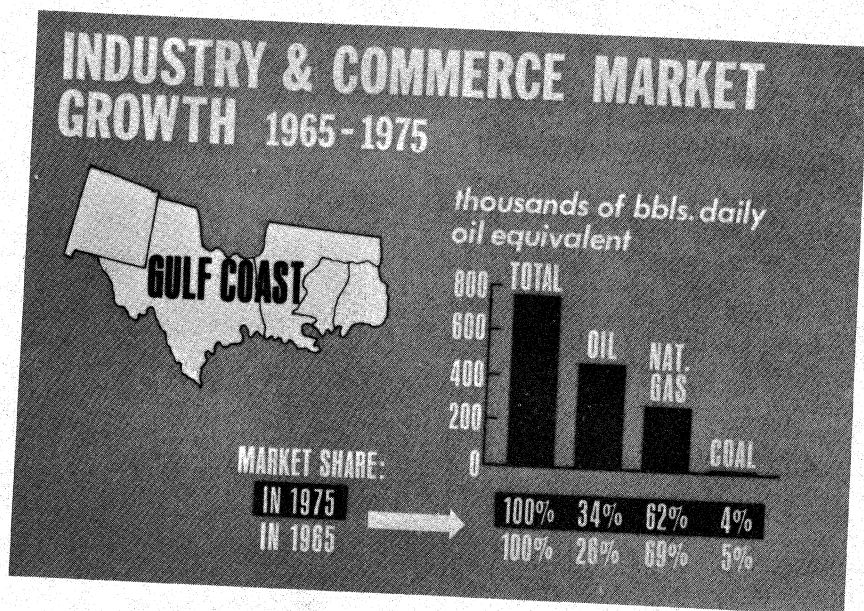


CHART 29

By 1975, if this comes to pass, natural gas will have 51 percent of the market, oil 31 percent, and coal 18 percent. [Chart 32.]

The residential market is shown on the same basis, the larger market occurring in the colder parts of the Nation, the north-central and east coast regions as illustrated by chart 33.

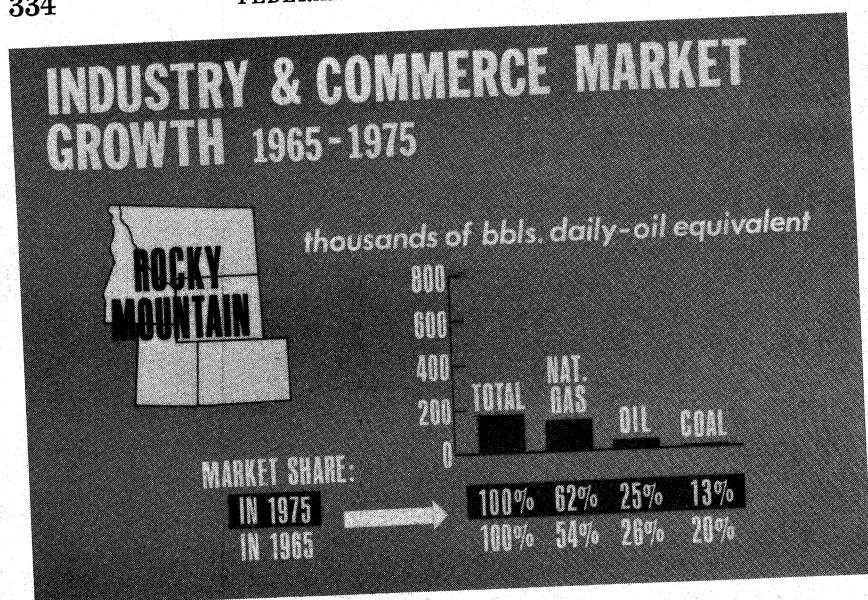


CHART 30

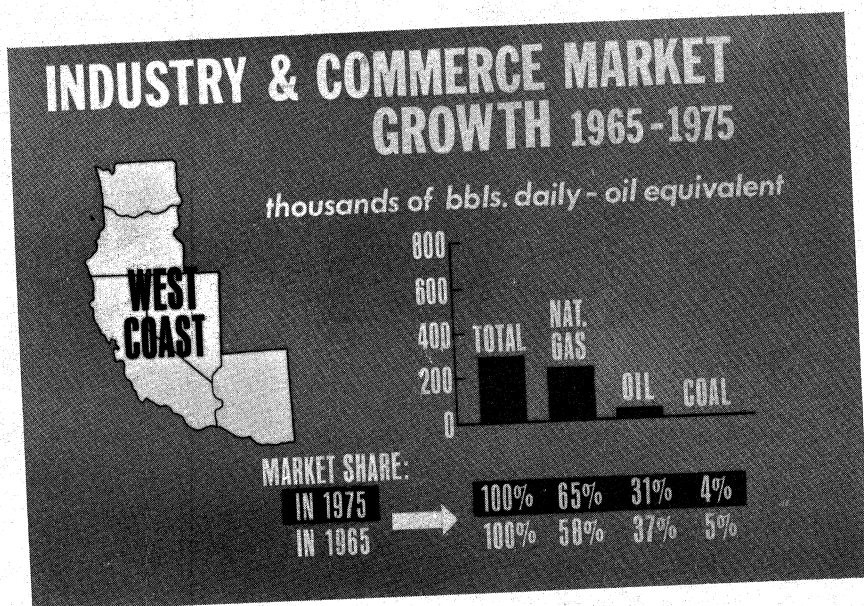


CHART 31

On the east coast, as shown on chart 34, natural gas is expected to get the larger share of the growth; then, oil, with coal losing out. This is the only market in the Nation in which oil has the lead position in the residential market. In 1965, it had 61 percent and gas 31 percent. By 1975, we expect gas to go to 37 percent and oil to drop to 57 percent.

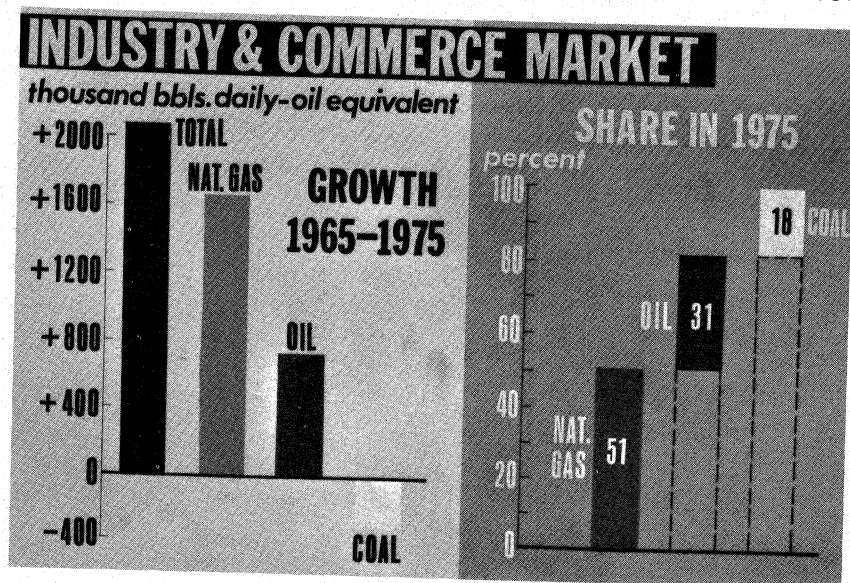


CHART 32

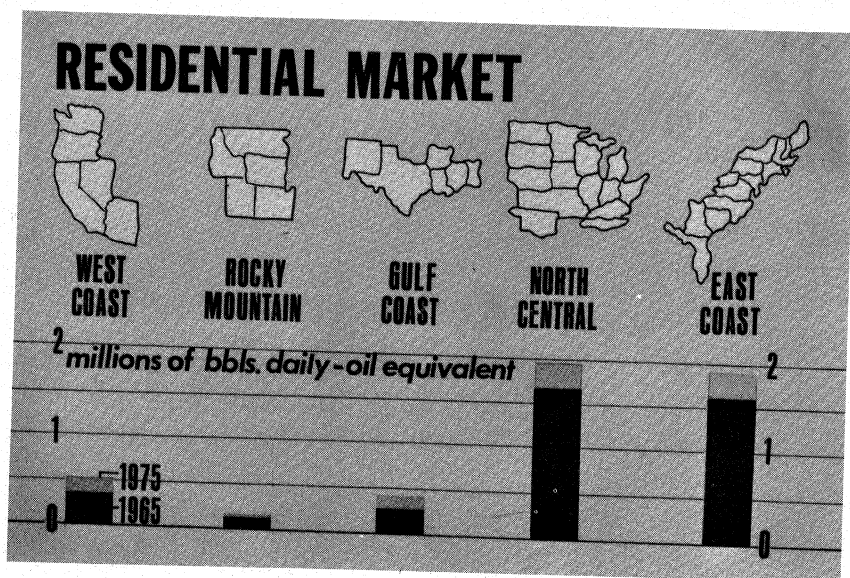


CHART 33

In the north-central-region market, the growth for natural gas exceeds the total market expansion, again coming at the expense of coal. Of course, we do have a direct competition between natural gas and oil, because it is quite obvious that, without the availability of gas, oil alone would be equally capable of displacing coal. [Chart 35.]

Down in the gulf coast area, gas, again, will get the major share of the market growth as shown on chart 36.

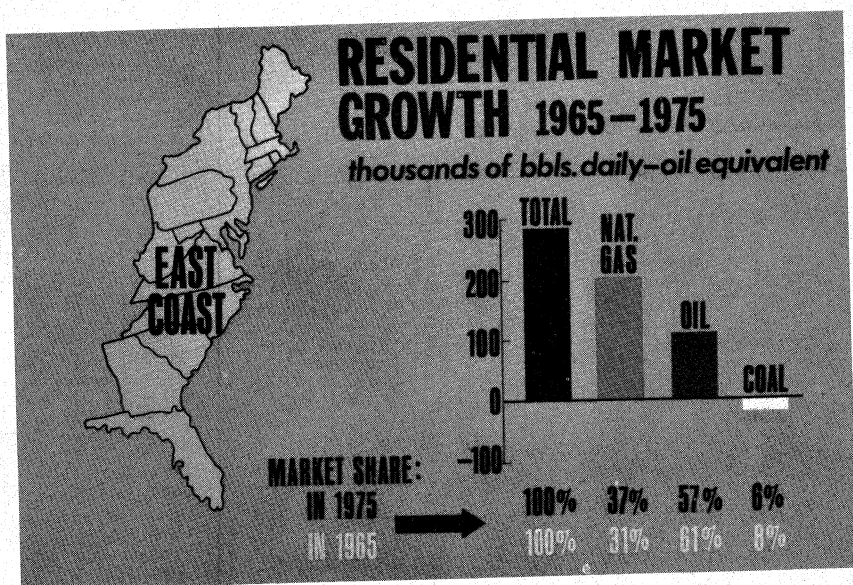


CHART 34

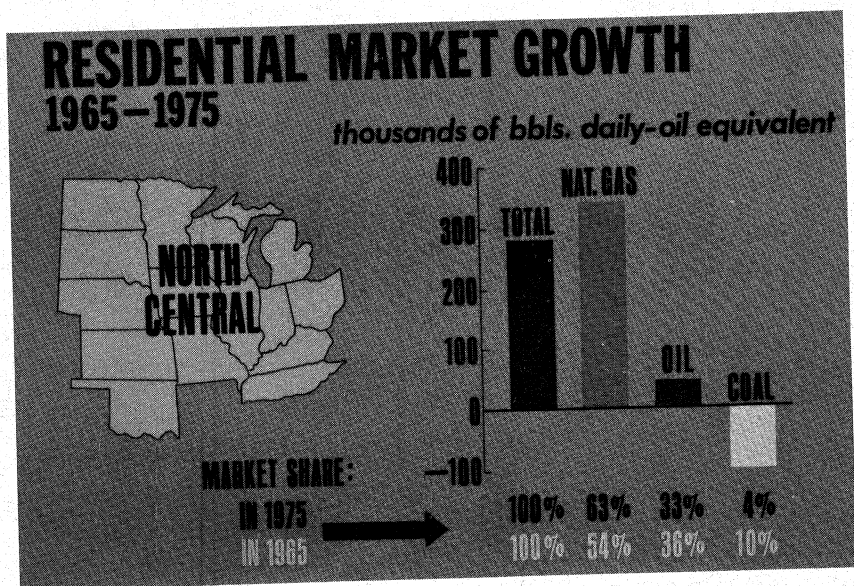


CHART 35

In the Rocky Mountain region, the same is true. [Chart 37.]
 And also on the west coast as shown by chart 38.
 All of these, of course, are important factors to bear in mind as we consider the prospects open to shale, and shale is going to enter the market under the label of "Oil."

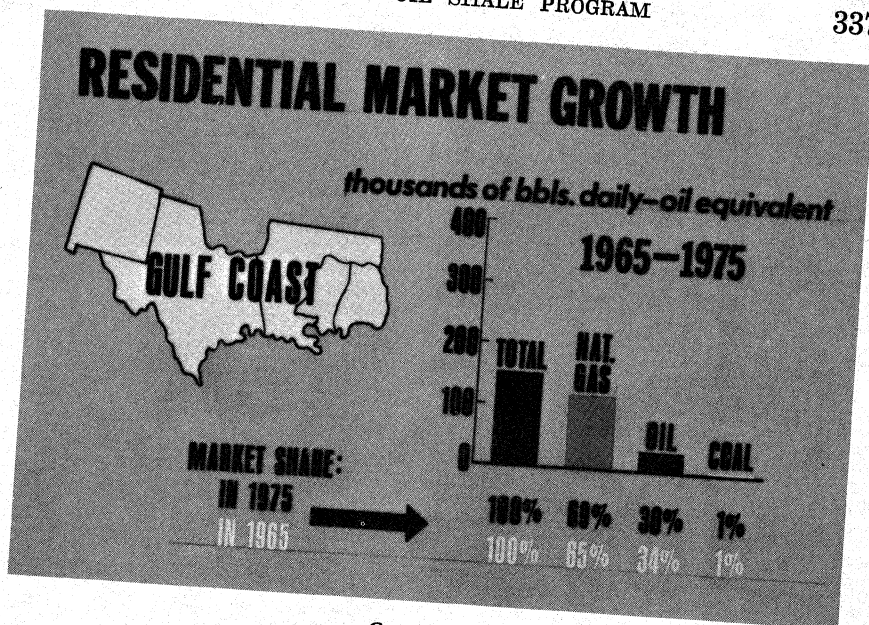


CHART 36

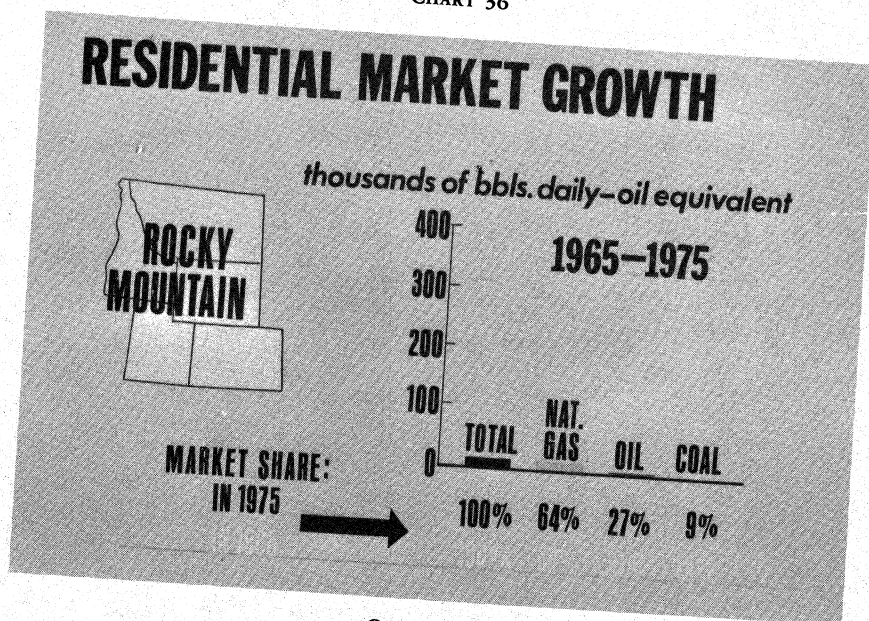


CHART 37

The total growth in the residential market should approximate 900 million barrels a day, and, as you see on chart 39, gas will get almost all of that; some growth for oil, and a decline for coal.

Again, if this comes to pass, natural gas will have 55 percent by the end of the decade, oil 41 percent, and coal 4 percent.

We have, in the transportation market, a different situation. This is the only market that has a potential for being stimulated. No one can

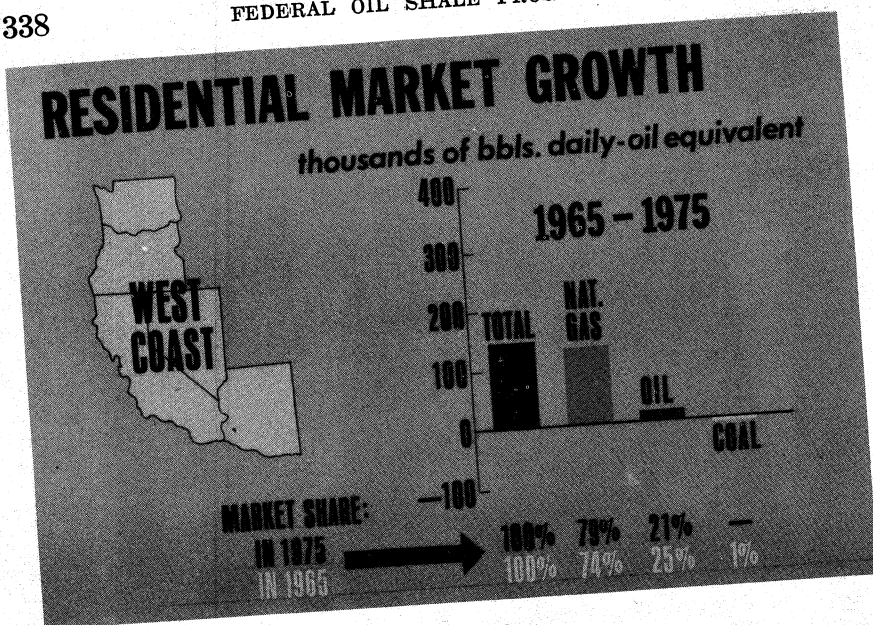


CHART 38

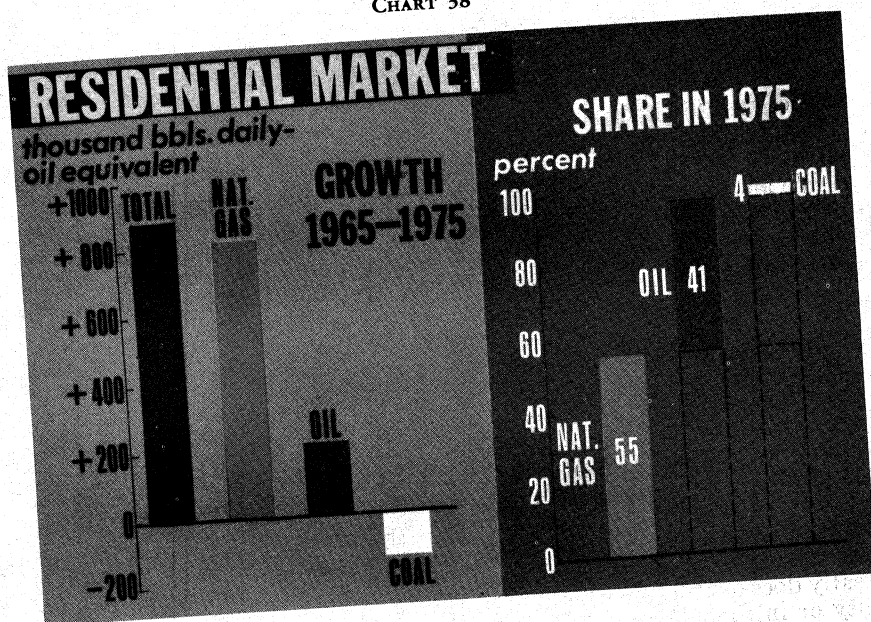


CHART 39

persuade any of us to turn up the thermostat in our homes beyond the comfort level. But we might be persuaded to use our automobiles more, and in that way the transportation market could be stimulated. The airlines might persuade people to travel more, and in that way the transportation market could be stimulated. We have other built-in ingredients for growth, however. Because of our population growth

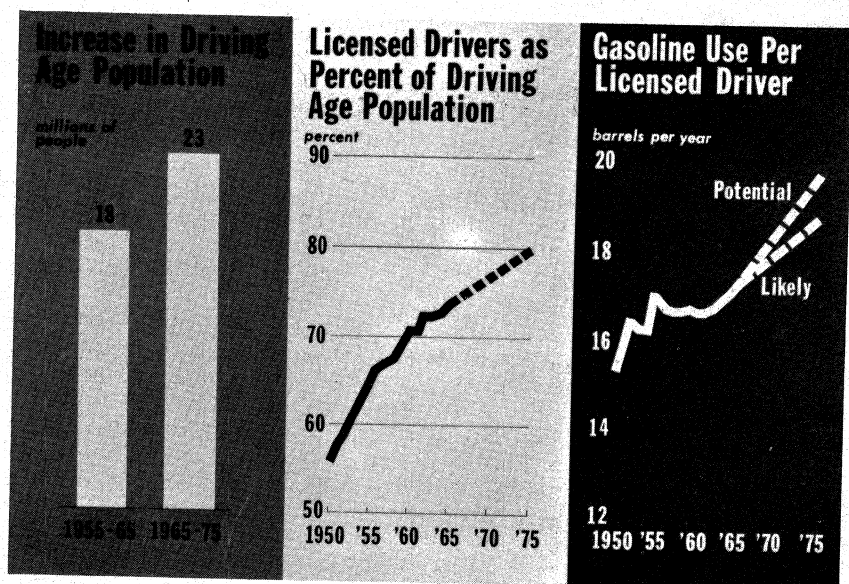


CHART 40

and the changes in the age groups, there is an increase in the number of people reaching the driving age. In the past 10 years, the increase amounted to 18 million people, and in the current 10 years we can expect an additional increase of approximately 23 million people. This, of course, is an ingredient for growth and tells us something about what we can expect in this market. [Chart 40.]

We also find that the number of licensed drivers of the driving age population has been growing as indicated by the dark line. And we have a projection up to 1975 indicating a further increase. I think that you would all agree that we are not likely to see 100 percent of all of the people old enough to drive actually being licensed to drive, but there is a sound basis for expecting the increase shown here.

This increase is, primarily, an increase in the number of female drivers. Female drivers have lagged behind male drivers in the past, but when we look at where our population is growing, we will find that our central cities of 1 million population and up are not exhibiting any growth. There is some growth for cities ranging from 1 million down to 100,000, but most of the growth is in areas of 100,000 down to 5,000. In some cases, this growth is on the fringe of central cities; in other cases, in communities set apart. We can find many communities where automobile use has quadrupled in the postwar period. It really does not matter whether the growth is on the fringe of the central city or in the communities set apart. In both cases, this increases the essential use of the private passenger automobile.

There have been surveys conducted which indicate that approximately 85 percent of the annual accumulated mileage of a private passenger car is for essential purposes with only 15 percent being for purposes of vacation travel and recreation.

I might cite many economic reasons for expecting a further movement away from our central cities in the future, that is, a proportional

movement: the improvement in communications, and the vast improvement which stems from our interstate highways permit a dispersal of economic activity. So, we think that this projection is reasonable and is reflected in the gasoline use per licensed driver shown. We can see that increasing further.

We have another projection which is labeled "Potential." This shows what would happen if the petroleum industry, through more effective marketing, through travel promotion, and a followup with the theme of "Travel America," could increase the miles driven by the average car owner by only 10 miles a week it would result in an increase in gasoline consumption shown on this chart.

Earlier, I indicated that we expected the U.S. requirements for energy in this 10-year period to be 40 percent larger than in the past. On chart 41 we have our scale at the top. We find that we consumed 80 billion barrels in the past 10 years and can expect to consume something over 115 billion barrels of oil equivalent in this 10-year period. The expansion in capacity for oil is 35 percent more; in natural gas, 53 percent more; in coal, 32 percent more; in water, 56 percent more, and in nuclear energy, 639 percent more. Obviously, when we look to the future we cannot forecast that precisely.

I want to bring out that we have no such thing in mind when we say 639 percent. Even though this is a tremendous growth, you can see that the amount of energy stemming from nuclear sources does not range large in relation to the Nation's total energy requirements. By 1975 nuclear energy is expected to be 5 percent, approximately, of the total energy part.

At this point, I must qualify this prediction: The 53 percent indicated for natural gas is the market growth that we would expect if there were a sufficient supply of natural gas to satisfy this growth,

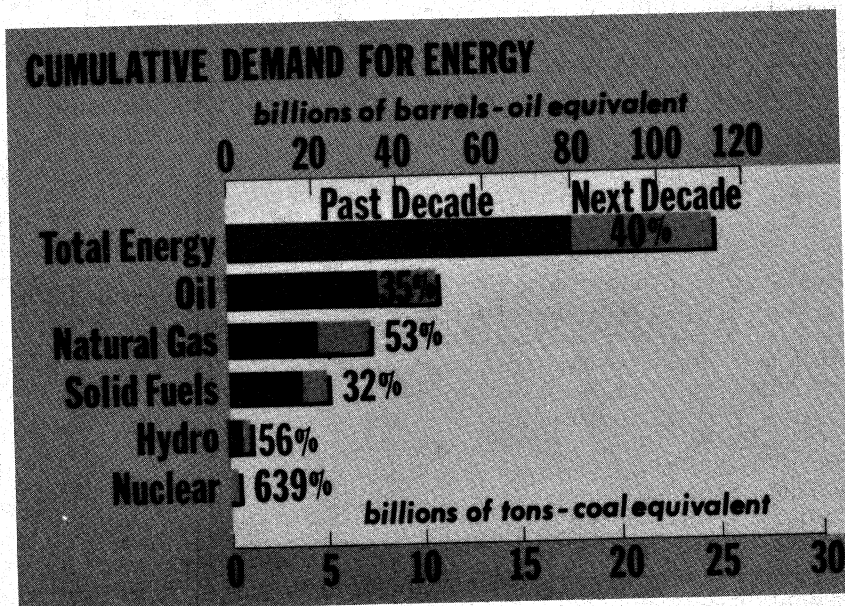


CHART 41

but there is some sound reasons for expecting that we may not have that much gas. I will go into that in a few moments.

The growth and prospects for coal are shown on chart 42. The growth is shown in both millions of barrels per day of oil equivalent and in millions of tons of coal yearly at the bottom of the chart. The overall growth, even though the total industry is going to feel the impact of nuclear expansion most, will be equal to, approximately, 1 million barrels per day, and all of that growth and more will occur in one market, the electric utility market. Coal is expected to lose ground in the industrial-commercial market and the residential market for two reasons: (1) competition from our sources of energy and (2) because industry and commerce in particular would be using more electricity.

The results in prospect for natural gas is shown on chart 43. This is very large, ranging from an oil equivalent of $7\frac{1}{2}$ million barrels of oil per day in 1955, and going up to approximately 11 million barrels per day equivalent by 1965. The overall growth indicated by market areas is shown. This, again, is the growth that we might expect if there is a sufficient supply of natural gas.

The growth expected for oil, as shown on chart 44, moves from just under 12 million barrels a day in 1955 to approximately 15.5 million barrels per day by 1975. The major market growth will occur in the transportation area. Not as much growth is shown for the other three markets, because of the competition from other energy sources. So, again, we can relate this to shale.

I think that this shows that the major market opportunities for oil produced from shale lie in the transportation area.

Up to now, I have been talking about the future, what appears reasonable. Now, we should consider the question of supply as illustrated on chart 45.

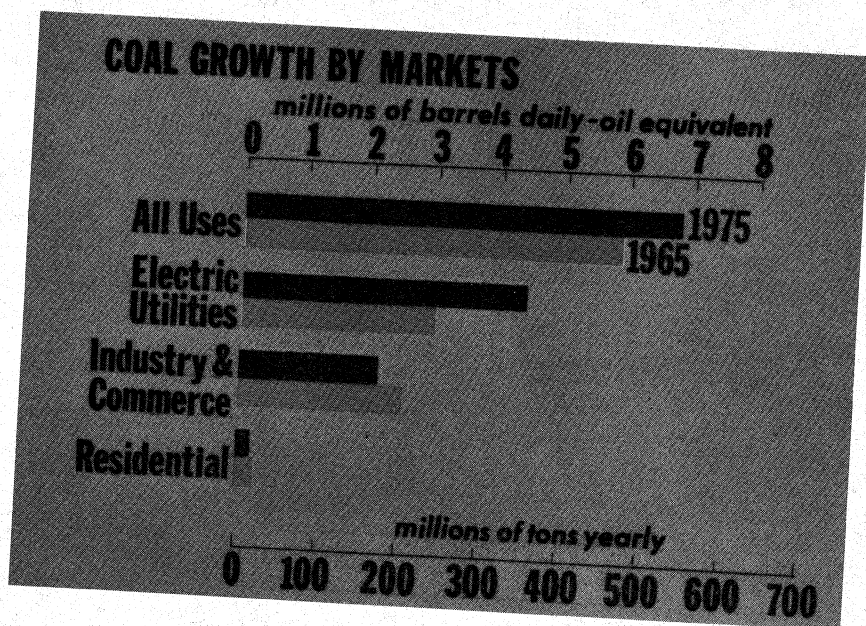


CHART 42

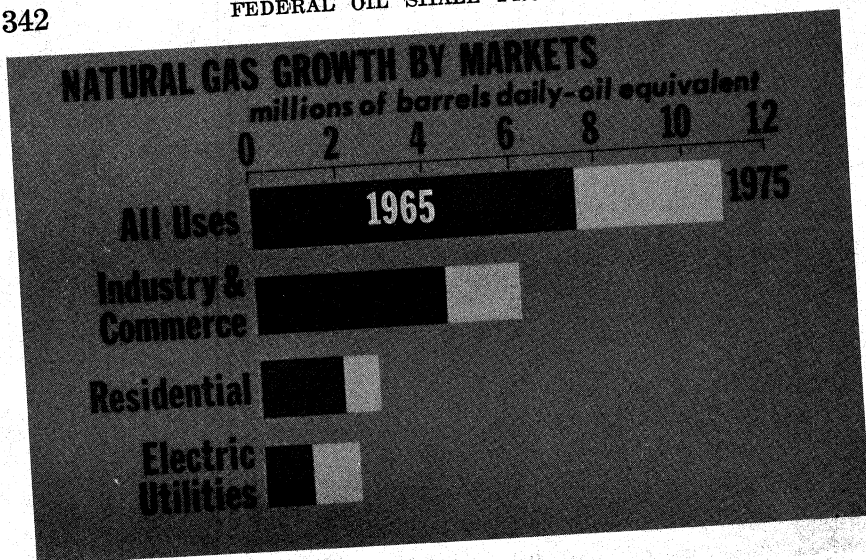


CHART 43

The matter of imports is a political matter, as we realize, and we see no basis for trying to predict what is going to happen in this area. We have assumed arbitrarily, so that we can get along with our work, that the current relationship between domestic production and imports will remain essentially the same. If this is, indeed, what will happen, our domestic industry will need to produce in 1975, the amount shown on this chart. Now, that is a growth that is considerably larger than the growth in the preceding 10 years or the difference between these two points. The expansion for imports, on the other hand, would be smaller in this decade than in the past decade. The reason for it being higher than in the past decade is that there is no mandatory control over the volume of imports. The amount of natural gas that would be required in 1975 is indicated. These volumes are equal. We have a scale of millions of barrels daily and trillions of cubic feet of gas per year. An easy conversion of this: 1 million barrels of oil per day will do the same amount of work in the energy market as 2 trillion cubic feet of gas per year.

The expansion for gas in this 10-year period will need to be larger than the growth in the past 10 years. We can expect some increase in imports, coming largely from Canada. There has been talk about moving natural gas by tanker from foreign sources, but I doubt if any large consumer of natural gas would want to time himself to a contract on the basis of such gas delivery. Let us consider a foreign source of gas being delivered by a tanker. When that foreign source discovered that this natural gas was displacing oil, and not returning an earning, they could correct that matter very quickly, and this would indicate that the tanker movement of gas would not be a reliable source. So, for the most part, we look to Canada as an increasing source of natural gas.

We need to consider whether or not the domestic industry is capable of producing an adequate supply of oil and gas in 1975. The first

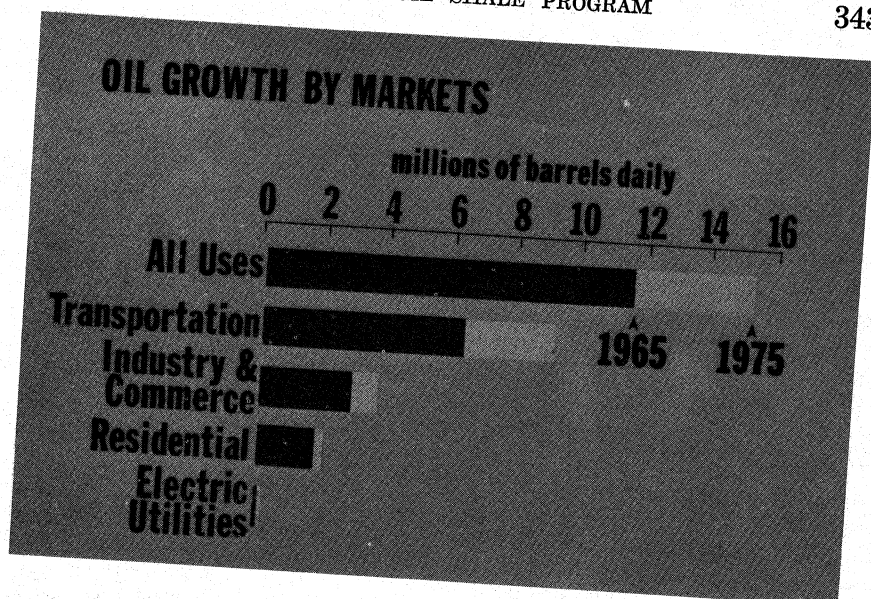


CHART 44

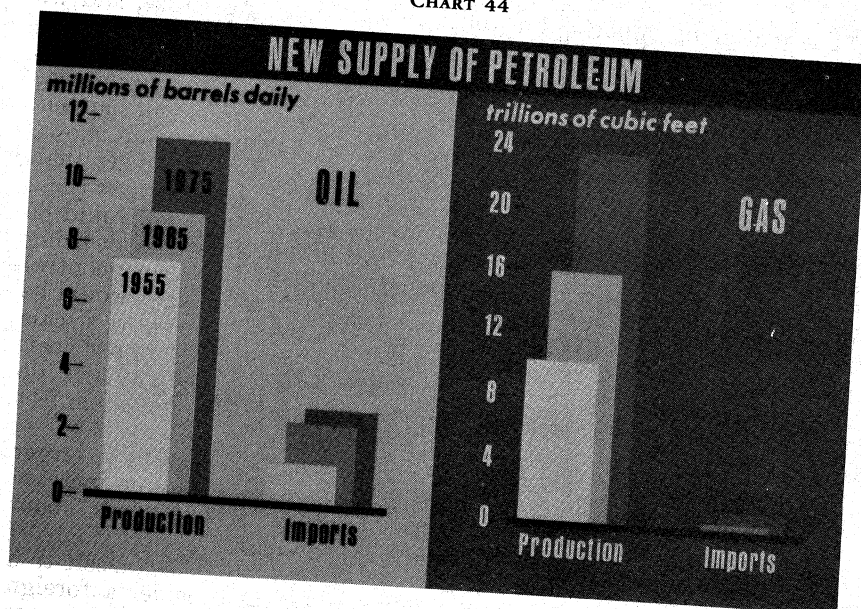


CHART 45

consideration is the industry's ability to add reserves. The trend lines on chart 46 are all 5-year moving averages.

Looking to the past, we find that the additions of gas reserves trended upwards for a period of years and reached a peak, and then moved down. The 1966 data are not shown here, but they indicate a further decline.

The reserve additions of liquid crude oil and natural gas liquids indicated by the trend line have moved progressively down in this period of years. Now, this is cause for concern, because in any economic activity we should have a favorable relationship between the size of our market and our inventories, whether they be above ground or below ground.

We know that when reserve additions are reported every year by the American Petroleum Institute and the American Gas Association the additions reflect in the main revisions of previous estimates. The upper trend line for natural gas indicates that, for most of this period, approximately one-third of the gas reserve additions reported each year reflect the discoveries within that year, and two-thirds are revisions of previous estimates.

For liquid reserves, the proportion is much smaller and currently only about 15 percent of the reserve additions reported reflect the reserves actually found within the latest reporting year, and 85 percent are revisions of previous estimates. This is still another cause for concern.

We can relate the reserve additions on still another basis, and that is barrels found per barrels produced, converting the natural gas into an oil equivalent. Chart 47 shows the decline over the period of years for both sources of petroleum. The reserve production ratio, which is most largely used within the petroleum industry and by the gas industry, is shown on the right-hand side of this chart. We see a progressive decline for gas and also for liquids. We have still further concern here. I think our primary point of interest should be the reserves that we have and not the produceability.

Why has not the domestic industry been more successful in adding reserves?

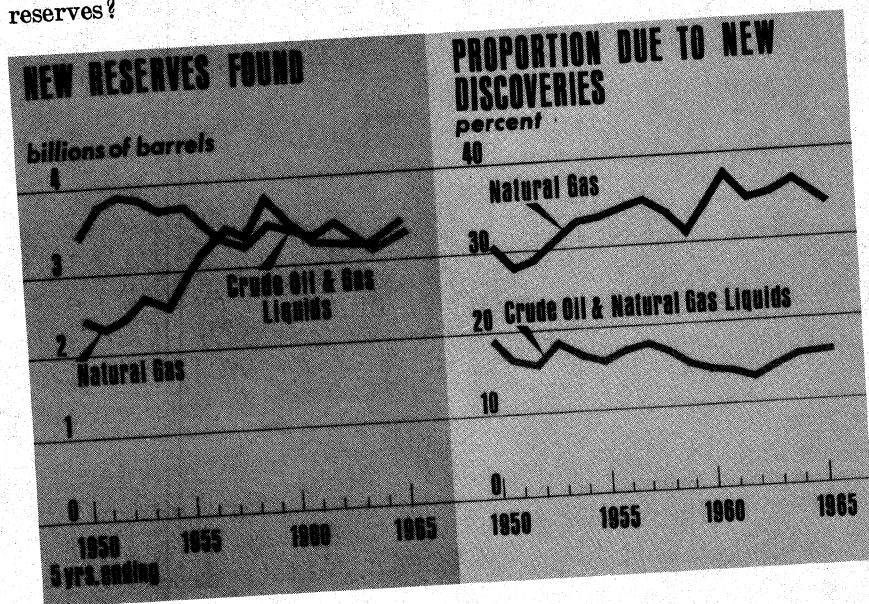


CHART 46

We get some answers suggested in chart 48, where we relate capital expenditures for exploration and development as a percentage of these two factors: (1) wellhead value; that is, the actual value of production of oil and gas at the well, and (2) related to cash income, cash income being the sum of net income in the writeoffs, almost the same as cash flow but not quite. So you can see the decline over this period of years which indicates that the incentive to spend more has been ample.

The actual capital spending for exploration and development is shown on chart 49. Again, we have a 5-year moving average. You can see the increase in spending for a period of time, then peaking out, and then dropping down and reaching a plateau.

We have 5 years of history plotted here in 1965. We can move back 3 years, pick up those 3 years and add the results for 1966, and for 9 years the domestic petroleum industry has spent on the average \$4.25 billion annually for this purpose. The expenditure in 1966 dropped below the \$4 billion mark.

We have related these expenditures to the reserve additions reported each year. That produces the trend language you see up in the corner. It appears that the domestic industry has been able to add $1\frac{1}{2}$ barrels of petroleum reserves for each dollar of capital spending, and this barrel and a half is almost divided between dry gas reserves and liquid reserves which you can see on the chart. This trend has stayed right at the 50 percent point.

I want to emphasize that we should not conclude from this that this is the cost of adding reserves. We do not know that; but this is the relationship. This is what the industry has been able to add in terms of what it has spent. Because of the stability in the recent trends we have a reasonable basis for making a projection, and I want to emphasize again a projection rather than a forecast.

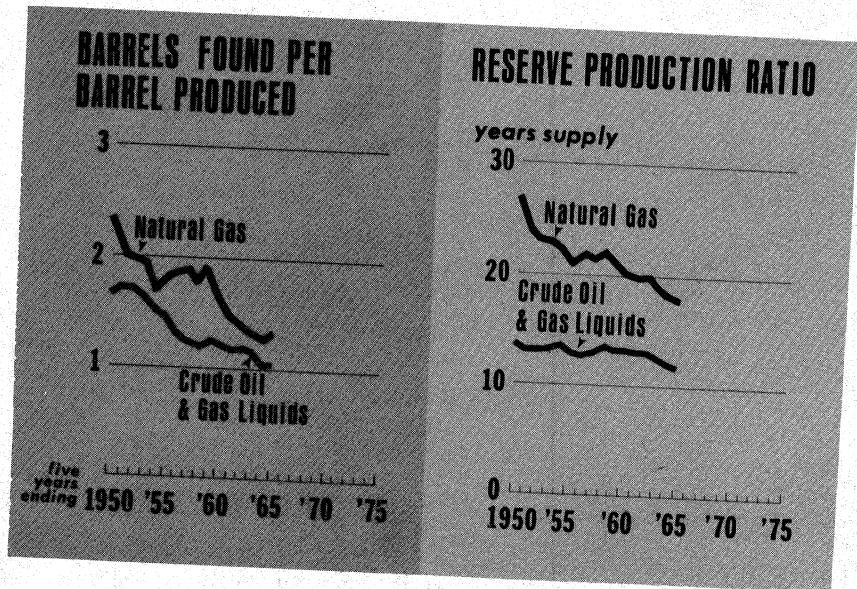


CHART 47

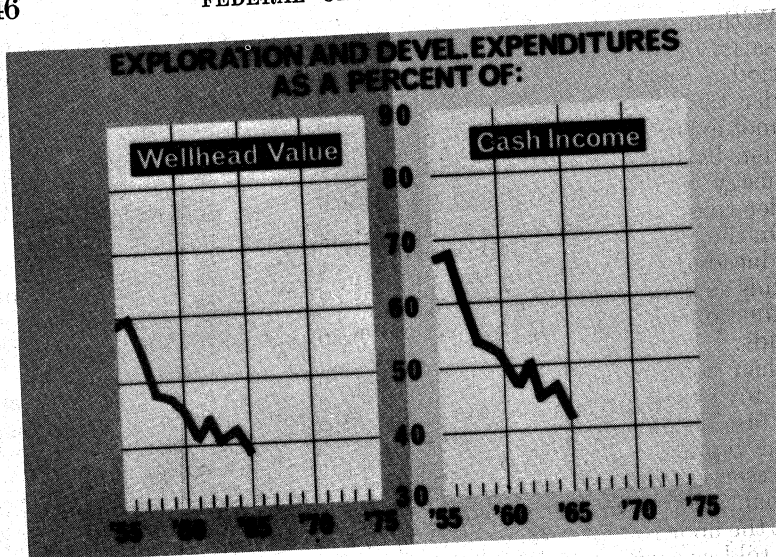


CHART 48

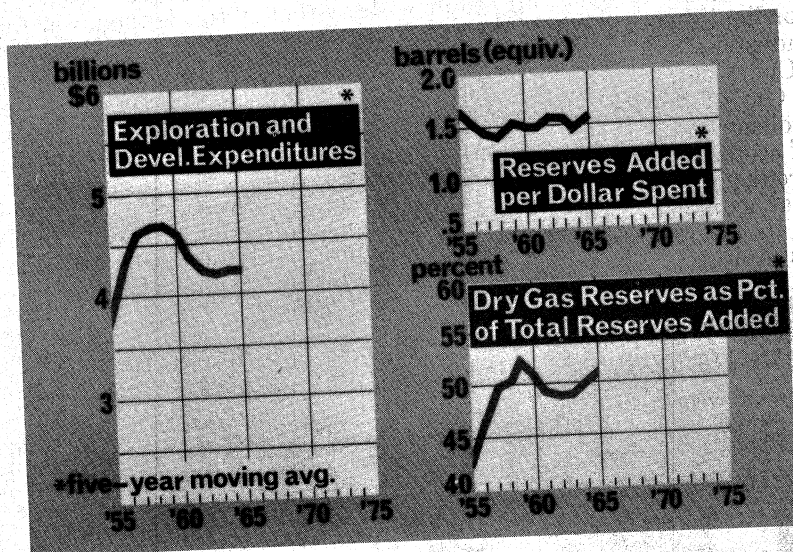


CHART 49

We have presumed that the industry will go on spending at the rate of \$4.25 billion a year and will continue to find a barrel and a half for each dollar spent, the same proportion as in the past. I should add that virtually no one in the petroleum industry believes that they will be able to find a barrel and a half of reserves per dollar spent.

It is also pointed out that increasingly more money may be spent for purposes of secondary recovery, and in that case it is reasonable to expect the proportion of gas and liquids to change—liquids to increase and gas to go down. If you will agree with me for the moment that these projections are reasonable, let us move ahead and see what would happen.

Without a proportional increase in imports, the domestic industry, to satisfy the indicated demands, will need to produce in this 10-year period a total of about 38 billion barrels of petroleum liquids, but under the assumptions I have referred to in the previous chart, we cannot expect the industry to find that much. It could find about 31.5 billion barrels. The same thing would be true for natural gas. The industry would need to produce more than it would be likely to find under these assumed circumstances. [Chart 50.]

On the basis of that assumption, then, the barrels-found-per-barrel-produced trend would decline for both natural gas and petroleum liquids as indicated in the broken trend lines in this chart. The reverse production ratio would decline, too, dropping down for gas and for liquids.

These conditions are not likely to take place. There are various reasons for expecting that the reserve production ratio would not drop that far. We have conservation measures coming into play with respect to the liquids, and in the face of this kind of a decline in terms of gas reserves, I doubt very much that the gas industry would be able to finance its expansion. So, something has to give. We do not know what the floor for our reserves should be. I can say that the gas interests have told us that they think a reserve production ratio of 15 to 1 is the lower limit. And most all people will say that 10 to 1 is the lower limit for liquids. I must add, however, that there are some in both of these industries who think that the reserve production ratio can go lower. [Chart 50.]

Out of the total revenue dollar flowing through the domestic petroleum industry, 85 cents can be placed to the production and sale of crude oil and refined products. Only 4½ cents can be placed to the production and sale of natural gas. So we have reasons to believe that management is going to be influenced in the main by the size of its liquid reserves and would not again, for the most part, spend its capital dollars to increase the natural gas reserves. [Chart 52.]

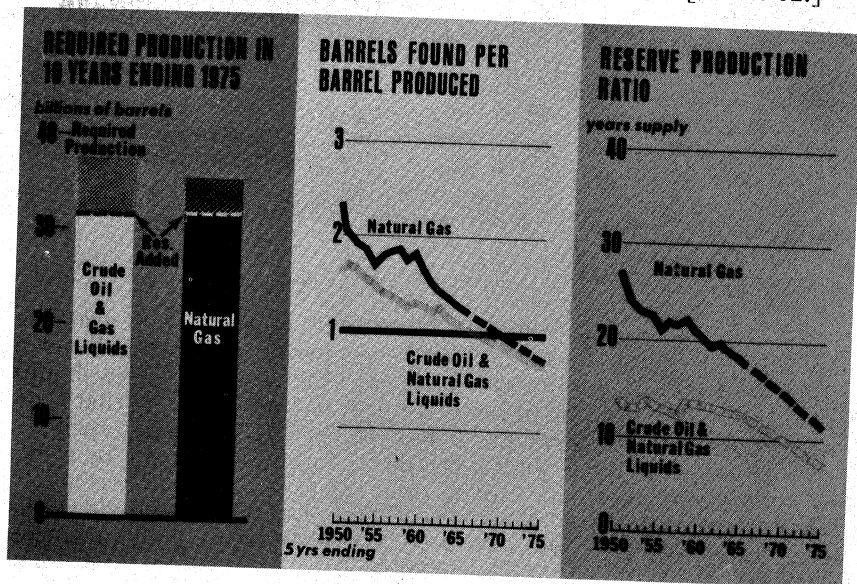


CHART 50

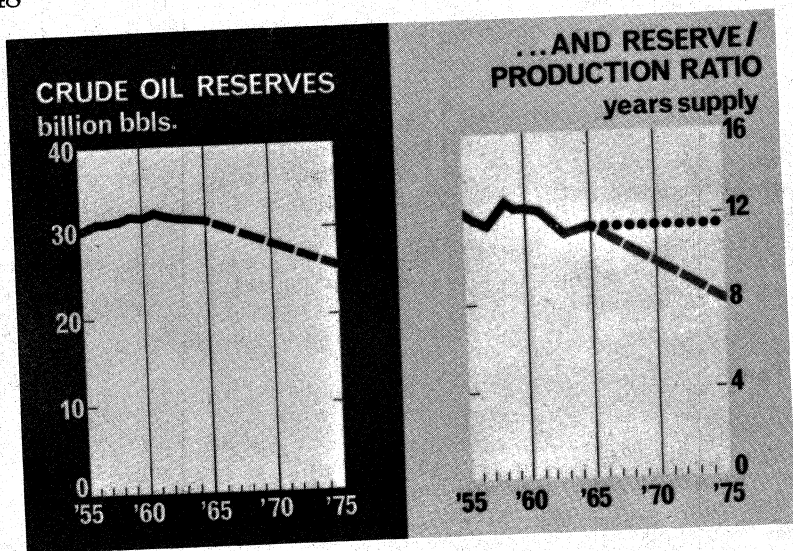


CHART 51

We must ask ourselves: how much more money must the domestic industry spend to keep the reserve production ratio of crude oil at the 1965 level? That is, to keep it along the level indicated by the dotted line instead of allowing it to fall as indicated by the trend line.

Under those circumstances, of course, crude oil reserves, instead of falling, as they would likely do under the assumptions I have stated, would need to increase.

Now, the answer to this question is staggering. Once, again, the actual expenditure for the past 5 years, the moving average, shows what the industry has been spending. Chart 52 shows how much more it would need to spend to meet the circumstances that I have put into our assumptions. The additional spending would be 50 percent more, or an average of \$2.25 billion a year. Frankly, we cannot find that much additional money for the industry to spend, as the percentage of the wellhead value, which reached that level in 1965, and in 1966, not shown here, dropped down to 35 percent would need to average 51 percent for this decade.

Major companies are spending in excess of 51 percent at the present time, but independent producers are utilizing little more than 30 percent of the wellhead values for this purpose. The decline in spending, as indicated, was brought about entirely by independent producers as a group. Major companies are spending more money now than they ever have, but independent producers are spending less than one-half as much now as they were 10 years ago.

We have then a question of what we might expect in the future. What is it going to take to entice the independents back into the picture, to cause them to spend more? If the independents cannot be enticed back, is it reasonable to expect the major companies to fill the void?

We cannot be sure that they will, because the major companies have very heavy capital expenditure programs abroad.

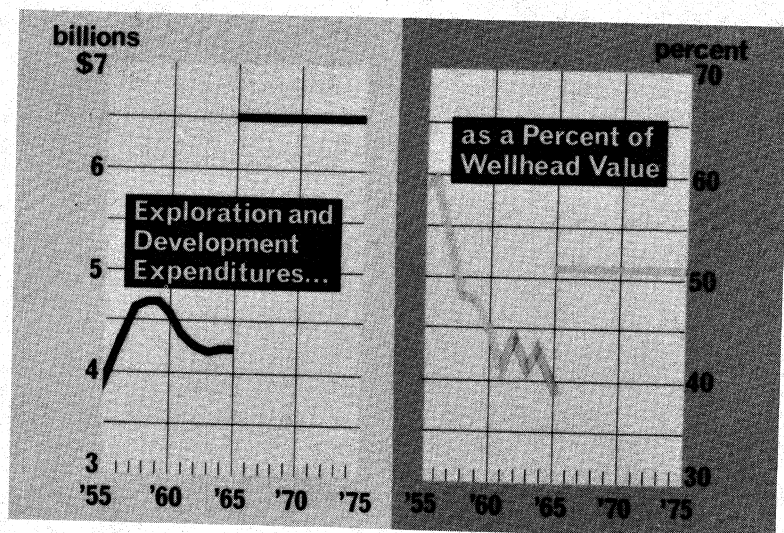


CHART 52

On chart 53 we have charted, for the post-war period, the wellhead value of the petroleum hydrocarbon production, starting at the beginning of the period at about \$2.5 billion and going to almost \$11 billion by 1965. You can see that the fastest growth occurred from this point up to this point (indicating).

On the side of the chart we find that, for the period ranging from 1946 to 1957, the average annual increase in wellhead value amounted to \$600 million and two-thirds of that expansion came as the result of the price depreciation caused by the severe economic conditions of the 1930's, when we were going through the depression. Also, because of large discoveries of new crude oil reserves and the fact that crude oil was severely depressed at the time we entered World War II, this depressed situation existed until the end of the war. With the lifting of the price controls in 1946, the price of oil crude increased approximately three times by 1957, and that was a major source of additional revenue flowing to the petroleum industry, and, of course, a large increase in available capital funds.

There has been no net increase in the price of crude oil since 1957. Indeed, there has been some decline. And in the period ranging from 1957 to 1965, the growth of wellhead value was less than one-half as large as it was in this earlier period.

If we project the growth of the wellhead value to the end of the decade, assuming a constant price for crude oil and some modest increase in the price of natural gas, this shows the trend line that results and the average annual growth would be only about two-thirds as large as it was back in this period of years.

Well, this indicates, of course, that the expansion of revenue and capital funds is going to be more restricted relative to the needs for capital spending than it was in the earlier period, and it tells us that management necessarily must be more selective.

We might also infer from this chart that there is a need for an increase in the price of crude oil, particularly if the independent

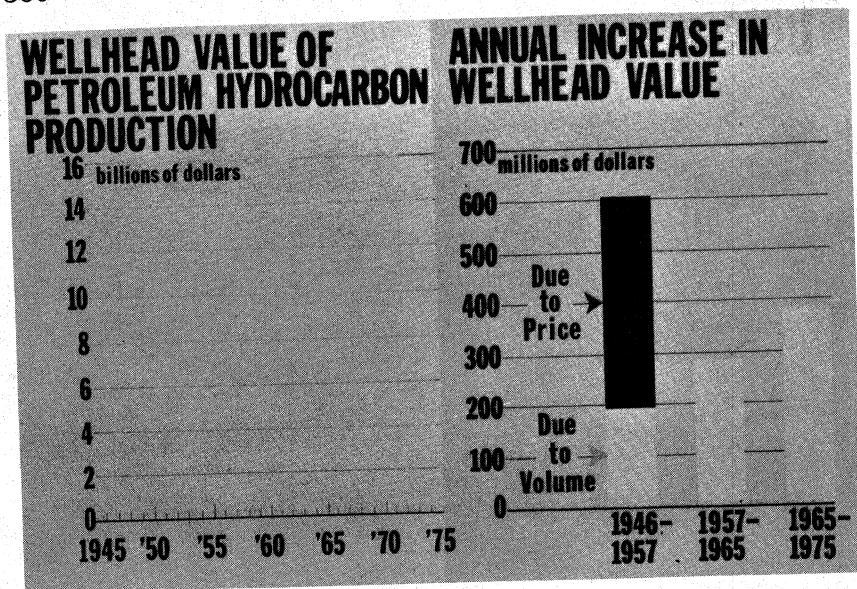


CHART 53

producers are to be brought back into the picture. But let us consider whether or not the economic realities of the energy market would permit an increase in the price of crude oil.

Starting over on the east coast we measure the delivered price to the consumer of the dominant fuel in each of these markets. This is illustrated on chart 54.

The single largest energy market is represented by industry and commerce. Oil is the dominant fuel that is delivered to the consumer for the average price of \$2.50 per barrel. And clearly we cannot have crude oil selling for almost \$3 a barrel and increase the price by 25 cents or 50 cents a barrel and have that price increase passed on in this market.

In the electric utility market, coal is delivered to the utility for the average price of \$1.53 per barrel equivalent. Now, clearly, an increase in the price of crude oil could not be passed on in that market. Oil is the dominant fuel in the residential market, delivered to the consumer for an average of \$6.70 a barrel, but oil is not capturing any of the growth, so to speak, in this market. Most of the growth is going to natural gas, which enters the market at a substantially lower price than oil, primarily because of the regulation of the price. So there is no prospect for passing on an increase in the price of crude oil.

You might also consider the effect of a 25-cent-a-barrel increase, which, when related to the total market price, would add about \$750 million of wellhead value. This is far below the indicated requirements of \$2.25 billion.

In the north central region (chart 55) the largest market is represented by industry and commerce. Natural gas is the dominant fuel, delivered for \$2.35 per barrel. Coal is delivered for \$1.36 in the electric utility market and natural gas is dominant in the residential areas

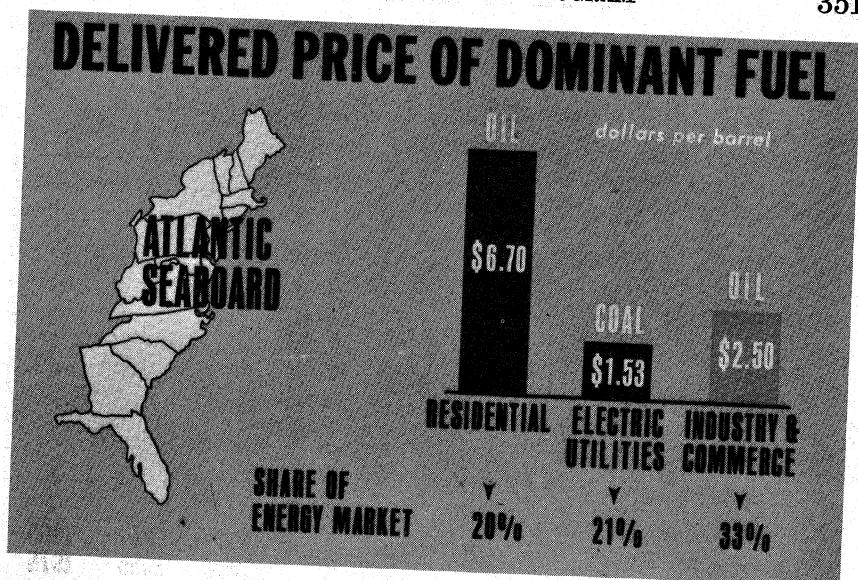


CHART 54

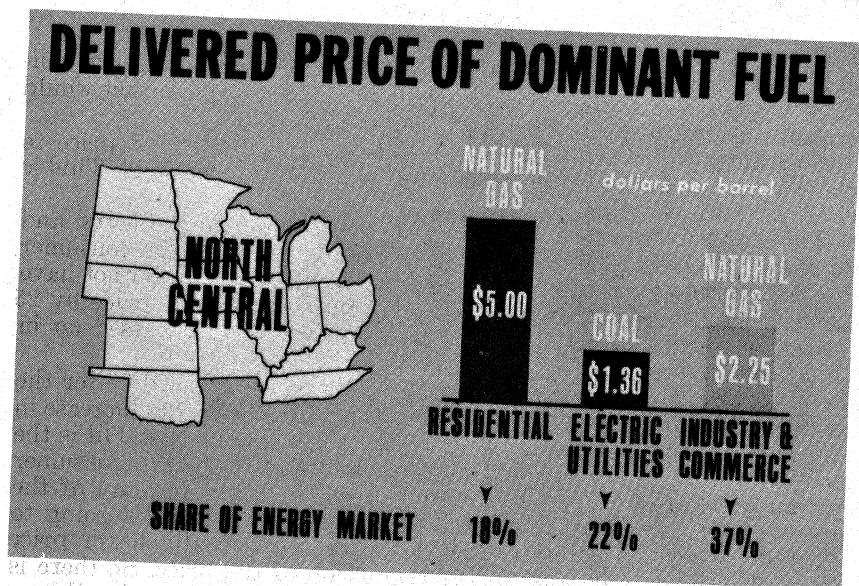


CHART 55

delivered for \$5 a barrel equivalent. Again, no prospect of passing on an increase in the price of crude oil.

In the gulf coast area natural gas is the dominant fuel in all markets and you can see on chart 56 the exceedingly low price at which it enters the markets.

So that in our major oil producing regions, there is no possibility of passing on a crude oil price increase. And note, also, the size of

the industrial-commercial market, 57 percent of the entire energy market, in the gulf coast region.

In the Rocky Mountain region gas is the dominant fuel, delivered for \$1.58 a barrel, and this is equal to 38 percent of the market. You might relate it to the prospect for shale oil entering that market. Coal delivers for \$1.25. Gas leads in the residential area for the equivalent price of \$4.50. [Chart 57.]

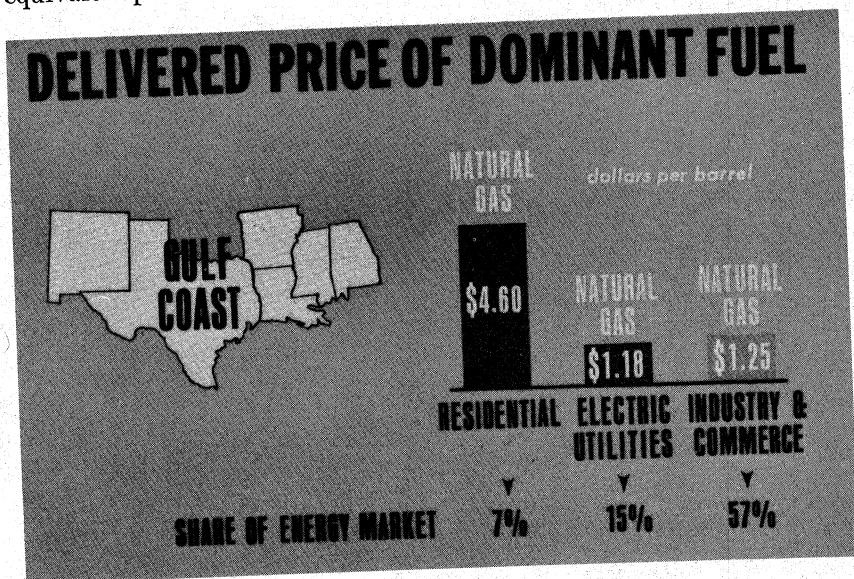


CHART 56

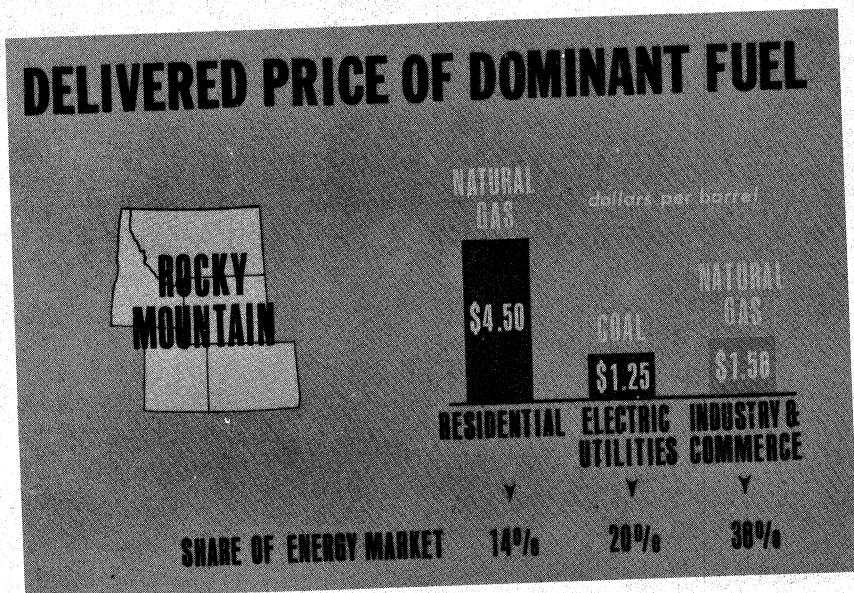


CHART 57

On the west coast it is natural gas across the board as the dominant fuel in all of these three markets and selling at prices at which oil cannot effectively compete. [Chart 58.]

For the Nation as a whole in the industrial-commercial market, representing 39 percent of the total energy market, gas is the dominant fuel and deliveries for the average price of \$2.10 a barrel. [Chart 59.]

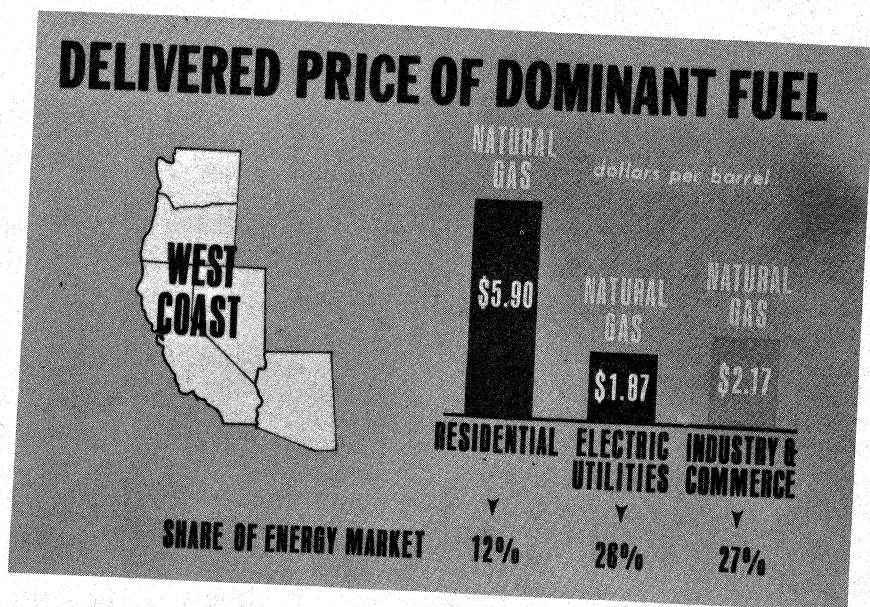


CHART 58

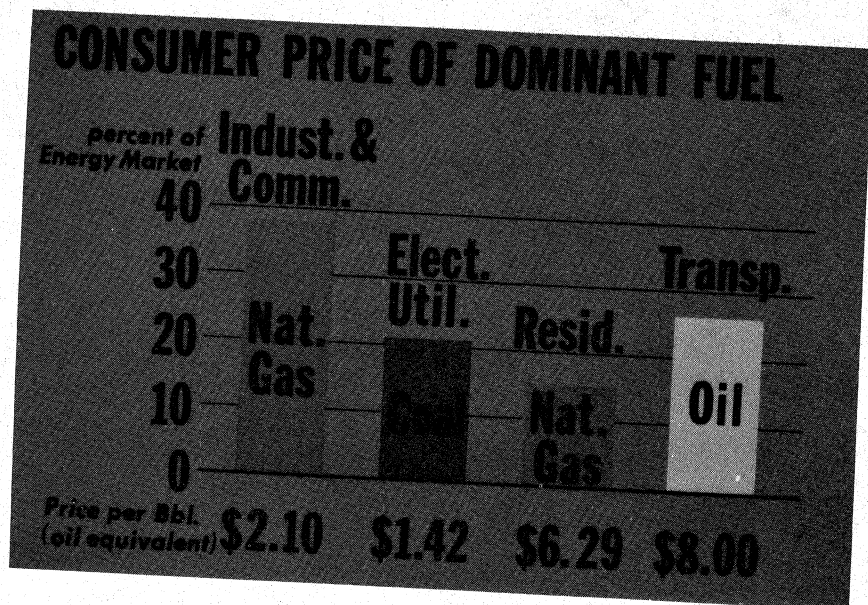


CHART 59

In the electric utility market, as you have already learned, coal is dominant and delivers for \$1.42 per barrel.

Natural gas is dominant as a fuel going to the residential areas delivering for \$6.29 a barrel.

Only in the transportation market is oil the leading choice, and, then, of course, petroleum liquids, as you have already learned, has all of that market. It delivers for the average price of \$8 per barrel to the consumer. This is the only market in which the petroleum industry reasonably can expect to pass on higher crude oil costs.

On chart 60 we again have our geographical breakdown, and we compare the refinery value of petroleum products entering two major markets. First, the transportation market, which is 25 percent of the total, then the stationary market, which is three-quarters of the total. Using the east coast as an example, the average refinery value of the products entering the stationary market is \$3.18. Clearly, it is not possible to increase the price by 25 cents.

Only in the transportation market, again, is it reasonable to expect to pass on an increase.

The same is true all around the Nation. We can make the same comparison in each of these areas.

Gasoline is far, in a way, the most important source of revenue for the petroleum industry. It accounts for approximately 59 percent. The price of gasoline at the pump, excluding taxes, follows the trend line on chart 61 over the past 10 years. It started out here [indicating] in 1956, but because of intense competition in the industry, the effects of our business recession in 1958, the price declined for a period of several years. It began to recover after 1964, but in 1966 it had not yet reached the point at which it was selling 10 years earlier. Consum-

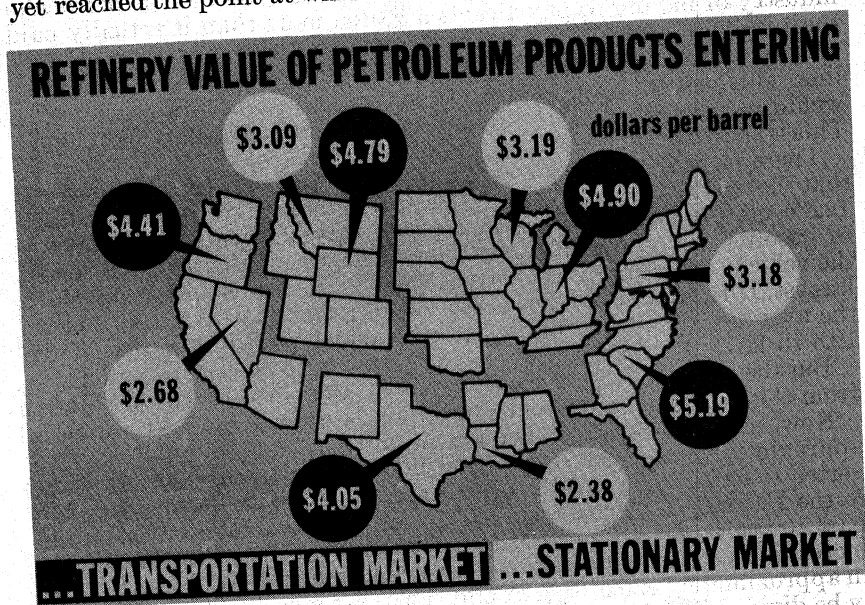


CHART 60

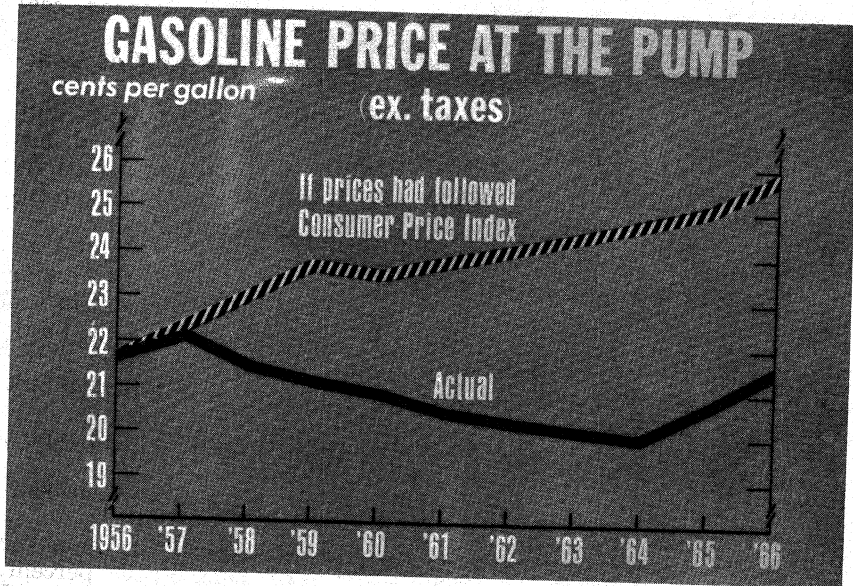


CHART 61

er prices, in general, however, were increasing over these years, and, if the price of gasoline had paralleled the rise of consumer prices, it would have sold for 4 cents a gallon more than it actually did in 1966. Let us consider the effectiveness on the consumer and the petroleum industry of having to pay 4 cents a gallon more than it actually paid for it in 1966.

The consumer in 1966 spent on the average \$140 a year for his gasoline. This is including taxes. If he had paid 4 cents a gallon more, he would have spent \$168. It would have cost him 50 cents a week more. This is shown on chart 62.

There is another way of looking at this. It has been demonstrated that the average cost of owning and operating a motor vehicle is about 12.5 cents per mile. Less than 2 cents of this 12.5 cents is for the cost of gasoline, including the taxes. The basic cost is the depreciation of the vehicle. Insurance is the next largest, and maintenance is the third largest. If the motorist had paid 4 cents a gallon more for his gasoline, the average cost of operating his automobile would have risen from 12.5 to 12.75 cents, or an increase of a quarter of a cent per mile.

But the petroleum industry would have taken in a total of \$19 billion from this market rather than \$16 billion, a difference of \$3 billion.

Now, since there is no increase in cost, we can roughly say that approximately one-half of this \$3 billion increase could have been converted to net income and the other half, of course, would have flowed to the Federal Government in the form of income taxes. If, over the past 10 years, the price of gasoline had risen in line with the average increase of consumer prices, the petroleum industry would have taken in approximately \$20 billion of additional revenue. That would roughly be divided into \$10 billion more to the industry in net earnings and \$10 billion more to the Government in the form of income taxes. If

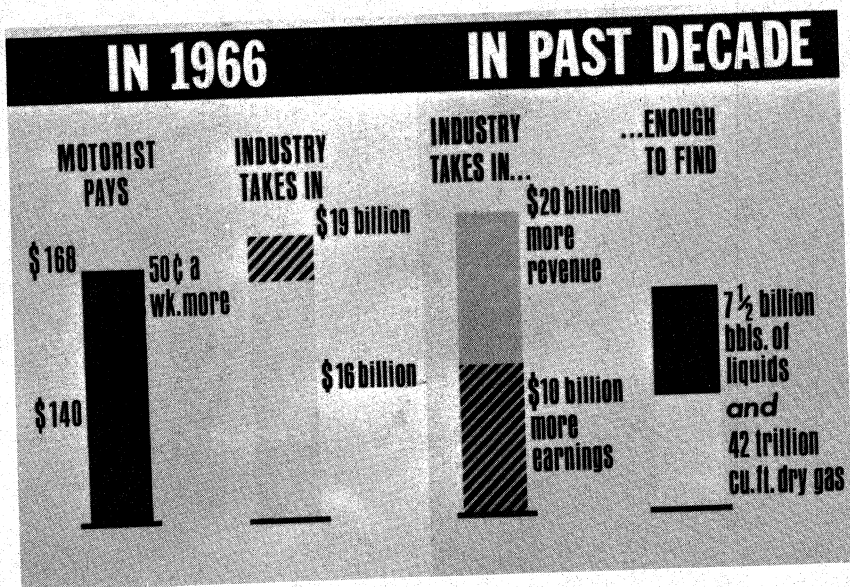


CHART 62

we suppose that industry utilizes this \$10 billion in a search for new petroleum reserves, it might have found approximately 7.5 billion additional barrels of liquid and 42 trillion cubic feet of gas. This would have been sufficient to have prevented the decline in the reserve-production ratio.

The petroleum industry, for reasons of competition, would have great difficulty in increasing the price of gasoline by 4 cents a gallon, and, certainly, as we witnessed earlier this year, there would be great resistance in the Federal Government to this movement.

Now, let us, for a few moments, leave the United States and consider the prospects abroad. This is very important, because in all of the capital spending in the free world petroleum industry, 70 percent is carried out by American-owned companies and, of all of the spending for production purposes, the money spent in search for new reserves, as much as 85 percent is carried on by American-owned companies. What happens in the future is going to be determined, essentially, by the same management. This population trend is shown on chart 63.

We have, in the free foreign parts of the world, about 10 times as much capital spending as we have in this Nation. Starting in 1955 with \$1.6 billion, it grew to \$2 billion by 1965, and we can expect approximately \$460 million more by 1975. This, again, is an ingredient for growth in terms of energy requirements in the free part of the world, and the per capita consumption in this part of the world is also rising rapidly. [Chart 64.]

All of our studies indicate to us that the free world use of energy in this 10-year period is likely to be two-thirds larger than in the past 10 years, and the consumption in the past 10 years was equal to 85 billion, which compares to 80 billion barrels in this Nation. So that the gross requirement abroad will be substantially larger than in this Nation.

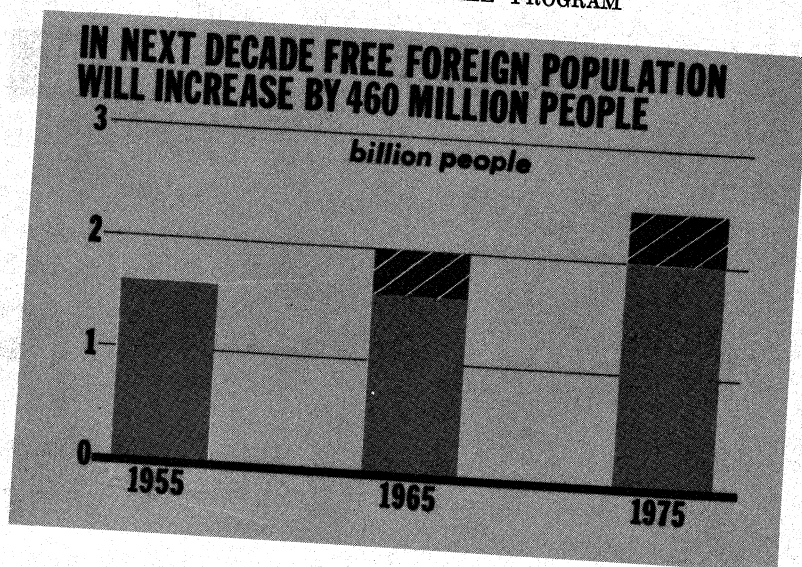


CHART 63

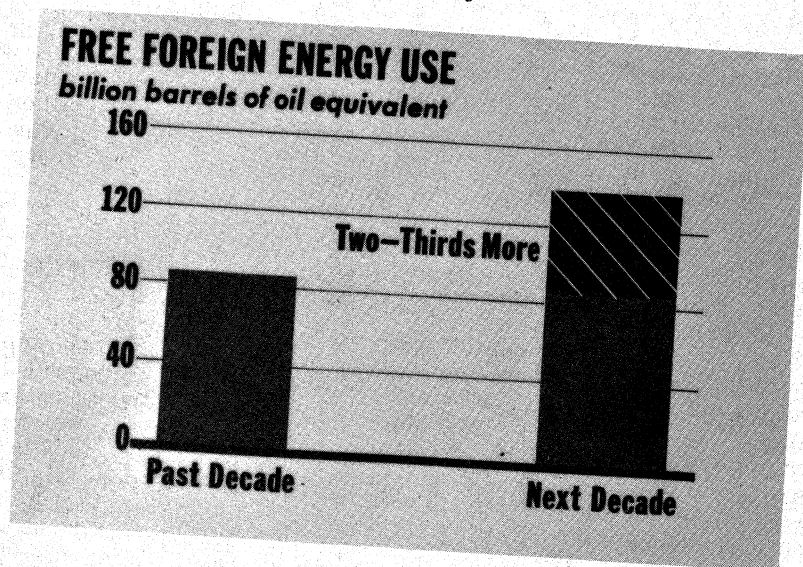


CHART 64

Chart 65 compares the pattern of the energy use in the United States and in the other parts of the world. We start with two time periods, 1945 in the United States and 1955 in the free foreign areas. We do this because the share of the market going to coal was approximately the same in both areas, somewhat more than half. When we see that the displacement of coal in the United States by both oil and natural gas is occurring, but more recently by gas alone, as oil has moved into a phase of decline, we find that nuclear energy has not changed its position essentially over this period of years.

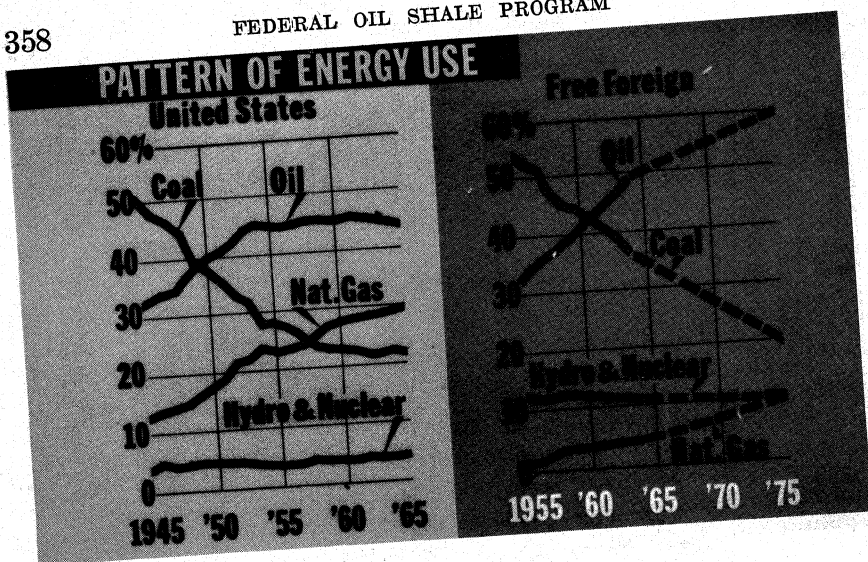


CHART 65

In the free foreign parts of the world there has not been much gas available to this market in the past as is indicated by this trend line. Oil alone has been capable of displacing coal, and oil's share of the energy market abroad is now greater than it ever has been in the United States. We recognize that substantial quantities of natural gas in the Netherlands and possibly the North Sea will be coming into the foreign energy market by the end of the decade, and we can also expect natural gas from recent finds in Australia to move into that market. There is question about whether gas from North Africa will move to market in extensive quantities because of the political difficulties that exist in that part of the world.

Even though more gas will be coming into the picture, we can still expect a further increase in oil's share of the energy market abroad. That means that the consumption of oil in the next 10 years is likely to be more than twice as large as it was in the past 10 years.

Chart 66 shows an expansion of oil production a great deal larger than we can anticipate in this country. The average growth indicated or expected in the United States is shown here, and the average growth expected in the free foreign countries is also shown.

Since we have essentially the same companies involved, management decisions as to where it is going to use capital funds in the future is going to be influenced by this growth. But, on the other hand, there is a force pulling in the opposite direction. We have a group of petroleum companies that we have studied for the past 30 years. We have studied their financial performances. This group of companies is in two-thirds of the world's petroleum industry, and the experience of this group of companies gives us a good benchmark for the probable experience of the overall industry. The rate of return on investment abroad for this group of companies is indicated by this trend line, and the rate of return on investments in the United States, the average invested capital, by the way, is also shown. In 1966 for the first time the return from abroad fell below the domestic return.

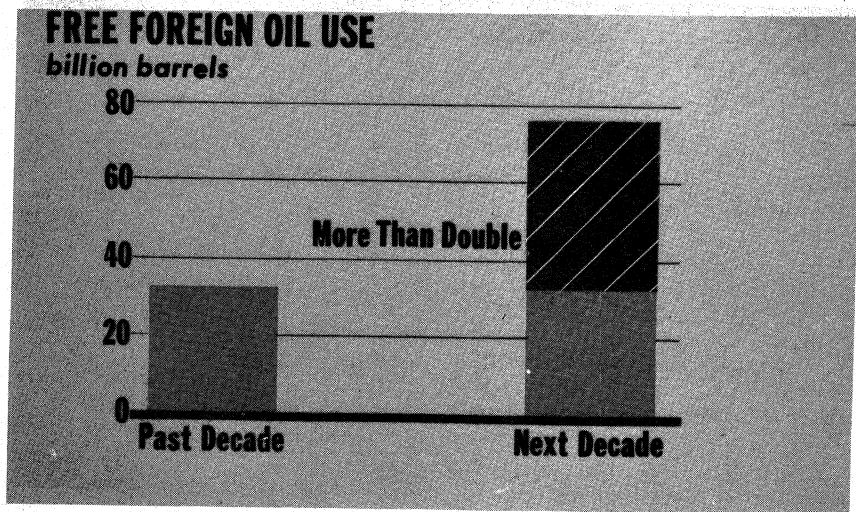


CHART 66

The improvement in the domestic return reflects, primarily, the modest increase in the price of natural gasoline. The decline in the rate of return abroad reflects a number of factors. Of great importance is the increasing demand on the part of governments in the producing countries abroad, those demands for a larger share of the earnings resulting from these operations. Also, there is intense competition, particularly in Europe.

There has been price erosion, and that, too, has been a factor in bringing down the rate of return.

Now, placing ourselves in management's position, what are we likely to do? We are pulled in two directions, as we can see from these two economic factors. We might expect that the industry would spend more in the United States progressively and less abroad, because you can see for a period of years the return has declined abroad and has increased in this country, but the industry has not reacted in this way.

We have seen the expenditures in 1966, \$6.8 billion being spent in the United States and \$7.6 billion being spent abroad. The increase in spending in 1966 amounted to \$450 million in the United States and the increase abroad amounted to \$759 million. This continues the trend that has been evident for a number of years. Progressively, the increase has been more and more money abroad.

We have found that industry has utilized its capital funds in 1966 so that 37 percent was used for production purposes; 28 percent for processing, refining and petrochemical plants; 17 percent for marketing; 14 percent for transportation, and 4 percent for all other purposes.

The amount of the money that the industry has utilized for production purposes has steadily declined, dropping from a high of almost 65 percent a decade ago. This, of course, reflects to a major extent the withdrawal of the independents, from this market.

What is the independent doing with his money?

We cannot begin to say, but, obviously, he has found many areas of economic activity that offer greater attraction than the petroleum business.

Thus, the petroleum industry in the free world, in the 10-year period 1945-55, spent a total of \$57 billion. In the following 10 years, the industry spent a total of \$112 billion. As nearly as we can estimate, the industry will need to spend, in the current 10-year period, a minimum of \$200 billion. And I say a minimum, because we have no means of measuring at the present time the additional capital investment that will be required for dealing with the problems of air pollution.

This leads to some king-sized questions. Under the present price structure and in view of the price erosion that occurred all over the world, and the prospects for price increases that we have, we have the greatest difficulty in projecting enough money for the petroleum industry to carry on capital spending at this rate. We had a decline in the price of crude oil abroad. We now have large quantities of natural gas coming into the European market. And nations abroad have looked to this country in terms of how our gas has been priced, and they possibly might make the same mistake that we have made here.

Pricing is not in terms of intrinsic value but rather as a byproduct; that is, one of the byproducts in the energy markets, and displacing the primary product and the financial effect is great, indeed.

The British Gas Council is dealing with industry in establishing a price for natural gas. The North Sea gas is moving into Great Britain. The gas council started out with an average of 18 cents a thousand cubic feet, and the gas selling for approximately 50 cents a thousand cubic feet would equate to the current price of crude oil at the Persian Gulf. If the price of gas that is eventually set in this part of the world is lower, then we can expect a further erosion in the price of crude oil and a further reason why it would be difficult for the petroleum industry to generate capital funds.

Some reference was made yesterday to the possible change in attitude as the result of recent events. We might conclude from that that there might be a desire to spend more in this country. On the other hand, because of this very great market abroad, there would be an equally compelling reason to spend more in other parts of the world—in Canada, Indonesia, Australia, Latin America, Africa. We have no assurance that the industry will choose to spend in this country. This brings up the final question: Will the industry choose to spend more in the United States or abroad, and, if it does spend in this country, will it spend it for oil shale versus conventional sources?

Senator Moss. Thank you very much, Mr. Winger, for that very comprehensive exposition of the growth of the energy market, and the demands upon it. I note that the reserves of gas and oil are tending downward, on a comparative basis, and, therefore, there is going to be a great need for additional energy. Whether we should look domestically or to foreign areas is the question. I was very fascinated with your presentation. It has been a very interesting presentation, and, certainly, one that is very comprehensive. It is certainly an excellent thing for a record. If you can supply us with copies of those charts, we will have them reproduced and put into the record. There is no reason that they cannot be reproduced in the record, together with your comments, and they will add greatly to our store of knowledge.

We appreciate very much the comprehensive presentation you have made.

Do you have any comments, Senator Allott?

Senator ALLOTT. Just one or two questions, Mr. Winger. We are very much appreciative of this presentation, which I think is the only one of its kind we have ever had on this subject before this committee. There may be those in the oil industry and others who would disagree—I do not know whether they would or not, but it is almost impossible to digest in one short session, or at least it is impossible for me to digest this in one short session, all that you have said in your presentation. Mr. Chairman, I think I have just one question of Mr. Winger. Am I correct in my belief that you are not opposed to furnishing these charts on paper to the committee?

Mr. WINGER. That is right.

Senator ALLOTT. Would it be possible for you to number those charts and when your testimony is reproduced—

Mr. WINGER. Yes, we can do that.

Senator ALLOTT (continuing). Key your testimony to the charts or plates, whichever you wish to call them, so that those who have only the benefit of the written record can follow your testimony with reference to the charts?

Mr. WINGER. Yes.

Senator Moss. If you would do that, sir, we would appreciate it very much.

Mr. WINGER. Yes, sir.

Senator ALLOTT. Thank you very much, Mr. Chairman.

Senator Moss. Senator Fannin?

Senator FANNIN. I, too, want to thank Mr. Winger for a very valuable contribution in this presentation. I was very much impressed with the part of his presentation that I was here to witness. I regret very much that I did not have the opportunity to hear the testimony. I look forward to reading the parts that I did not have the privilege of hearing. But I was very much concerned about some of the statistics which were being used and concerning which we were amazed. I am sure, Mr. Winger, that you have them authenticated, but the percentage of the power or energy that will be developed by atomic energy in the next few years seems quite low, judging by estimates I have heard from others. I think you said 5 percent by 1970.

Mr. WINGER. Five percent by 1970, with about 12 percent by 1980.

Senator FANNIN. By 1980, 12 percent.

Do you feel that the combination atomic energy plants that are now under construction and being considered for water conversion and power development will have the possibility of changing that statistic?

Mr. WINGER. Well, the pace of forward technology is so swift that I do not think we should ever rule out this possibility. There could be some change of a technological nature that might alter the situation by 1980, and I think I should say again the condition upon which we have made this forecast is based upon orders placed for 80 plants. All but 14 of these plants are firm orders, but I should also point out that I believe all the orders have cancellation clauses. In the unfortunate event that there should be a major nuclear accident of some sort, then we might expect that these clauses would become effective, so there

is another possibility. The impact that I trace was on the assumption that all of the plants would be constructed.

Senator FANNIN. Well, considering the tremendous need for potable water, and also for irrigation water throughout the world, do you think possibly greater emphasis will be placed on these new programs which could affect the statistical information you have given us?

Mr. WINGER. Yes, indeed. Water is a major problem and the shortage of water, particularly in the North Atlantic regions, is bringing about a shift of economic activity. That brings about a further shift in our energy markets, and not very much, as you know, has been done about this in the past. With the growth of our population and our economic activity, we are going to require far more water than we consume today, and what you say certainly could come to pass.

Senator FANNIN. Thank you very much.

Senator MOSS. Senator Hansen.

Senator HANSEN. I do not have any questions. I would like to compliment you on a very comprehensive presentation this morning. I think that it will serve a great purpose in bringing to the attention of everyone what the developments have been, what the prospects for increased uses are and how these added energy requirements will be met by the various sources of energy. I certainly do wish to compliment you and the Chase Manhattan Bank that you represented so ably this morning for having undertaken and completed a very fine, comprehensive statement.

Senator MOSS. Thank you, Mr. Winger. We are very appreciative of your presentation. It certainly was most comprehensive and printed in our record will make it very meaningful. Thank you.

I now relinquish the chair to the chairman.

The CHAIRMAN (presiding). Thank you, Mr. Winger.

The Chair would like to call Senator Paul Douglas at this time and at the same time ask Mr. Barry to come up. I think it will be more expeditious that way.

Senator Douglas, we are delighted to welcome you back to the Senate. The Chair had the privilege of serving with you a long time and we all honor and respect your views and judgment. We shall be delighted for you to make your statement at this time, and I have asked the Solicitor of the Department of the Interior, Mr. Frank Barry, to respond to whatever questions that you would like to ask him. On the other hand, it might be more useful if he could respond in general to your statement. Would you give him a copy?

Mr. DOUGLAS. Yes; I just have, Mr. Chairman.

The CHAIRMAN. All right; you may proceed.

STATEMENT OF PAUL H. DOUGLAS, FORMER U.S. SENATOR FROM THE STATE OF ILLINOIS

Mr. DOUGLAS. Mr. Chairman and members of the committee, I am happy to respond to your invitation to testify. The request was made formally late yesterday afternoon and I was under some pressure to prepare testimony and also to make copies so that I have not been able to submit the full 100 copies which I ordinarily would like to do.

It so happens that I spent 2 days in July out in the oil shale country of western Colorado and also spent 3 days in Denver trying to acquaint myself at firsthand with some of the problems that are involved.

I think I should say that I did so as a private citizen, at my own expense, not for any private interests or claimants.

On the first day in the oil shale country of Garfield and Rio Blanco Counties I inspected the processes and plant for developing oil from shale at Anvil Points near Rifle, Colo. This was substantially the plant which the Bureau of Mines operated for approximately 10 years, which was closed down in 1954, the same time that the Louisiana Reserve was closed down, and which was started again, I believe, in 1962.

I went into the high up lateral mine at Anvil Points, and I may say it is striking to think of oil being several thousand feet in the air. I always thought of oil as being underground, but there it is in the air or at least some of it is in the air. And then I went down the mountain side 5 miles to the crushing and retorting process plant as well as that of first refining, which are on successively lower levels close together, and saw something of the process involved which I believe utilizes the so-called gas combustion process for the retorting.

I tried to do the same thing at the TOSCO plant—that is, the Shale Oil Corp. plant—a few miles away; but, in keeping with the common policy of that company, I was barred from entry. This the corporation had every legal right to do since it owns the land.

I also went up into the property formerly used by the Union Oil Co., which is now not used.

When I went to Colorado, I thought that the issues involved were primarily those which were discussed yesterday. I thought that the Government title to the land was clear, firm, undisputed, and that the problems involved were simply royalties in amount or system of payment, the question of patents, the problem of conservation, what to do with the ash from the rock which was crushed but not used for oil, the question of the definition of net income and a series of other measures which were touched on yesterday. In other words, I thought that the Government title was clear, firm, undisputed, and would not be subject to challenge.

I found that this may not be so. This was the great surprise and the great alarm which I experienced. As the chairman said, I shall not go into the pre-1920 claims except to say that it is the common knowledge that these are very extensive, and that there have been court decisions which seem to legitimize them, although they have not been worked or developed in many cases. I think in the majority of cases, they have apparently been abandoned, but they have been bought up for one reason or another by speculators, and which constitute valid claims is very undecided because of not only the decisions of the Supreme Court in the *Krushnic* case and the *Ickes v. Virginia and Colorado* case but also the decisions of the district courts as handed down by Judge Doyle and Judge Shelton.

But I shall not address myself to those claims in keeping with the very proper ruling of the chairman.

What surprised me was the large volume of recent claims, claims originally filed in 1966 and going on into 1967. I think I may say that my attention was first called to these claims by articles which appeared in Mr. J. R. Freeman's *Farmer & Miner Journal*, published in Frederick, and while I want to make it clear I do not agree with some of the personal judgments which Mr. Freeman has indulged in, I do think that taking up the cause has been of a very heroic nature.

So on the second day I visited the offices of the county recorders and clerks of Garfield and Rio Blanco Counties at Glenwood Springs and at Meeker, respectively. Here I started to find the large number of mineral claims which had been filed during the preceding 22 months and in particular those filed by Mr. Merle I. Zweifel of Shawnee, Okla. It is about these claims that I should like to address myself. I found that Mr. Zweifel had filed over 338 claims by my count in Garfield County, and I ran my fingers down each one of the entries and totaled them. These were on half of quarter sections or 80-acre parcels making a total of his filings over 26,000 acres.

In Rio Blanco County Mr. Zweifel filed on over 2,500 claims or by my count 2,577, which filled 11 volumes of county records. These were filed during the period from May 6, 1966, to May 17, 1967. These were predominantly, and in every case that I could isolate, on quarter sections, that is on 160-acre lots, and hence the claims in this county alone were on approximately 411,000 acres or over 65 square miles.

About 130 of these claims were filed subsequent to the January 27 withdrawal order of Secretary Udall. I have Xeroxed an index of these claims in Rio Blanco County alone, which with each claim being given one line—in the original record books, of course, each claim takes up two pages, but on this index of claims each claim is given one line—it covers both sides of some 40 sheets, which I should like to submit in evidence.

The CHAIRMAN. Without objection.

Mr. DOUGLAS. I would like to have that back.

The CHAIRMAN. The information will be received by the committee.

Mr. DOUGLAS. There is a nice question of whether it should be printed in the record, it would take a lot of space, but I think it is crucial and important.

The CHAIRMAN. In any event, I think, Senator Douglas, it should be appropriately identified.

Mr. DOUGLAS. OK.

The CHAIRMAN. And so it will be on hand and can be made available in that respect.

Mr. DOUGLAS. Yes.

The CHAIRMAN. We will examine it to see.

Mr. DOUGLAS. It is the only copy that I have. It is somewhat costly to make this, but if necessary, I can give it to you.

Senator ALLOTT. Could I ask you one question at this point?

Mr. DOUGLAS. Certainly.

Senator ALLOTT. You said in the records they took two pages. I assume therefore they were recorded rather than filed.

Mr. DOUGLAS. I am not acquainted with the technical legal terms, but the claims would be filed on each claim of 160 acres or 80 acres, and the body of the claim will take up approximately two pages. Now if you can say they are filed, that is all right.

Senator ALLOTT. I assume then it was recorded. We can check that.

Mr. DOUGLAS. Now I have had Xeroxed the index for Garfield County, and it is in the mails. I do not have it with me at the moment. I would like to have the privilege of submitting it as well.

The CHAIRMAN. Without objection, the committee will be happy to receive that information.

Mr. DOUGLAS. I have seen what purports to be a signed letter by Mr. Zweifel in which he states that he has filed approximately 20,000 claims on approximately 4 million acres. While in Rio Blanco County at Meeker I was kindly given a map of the filings in that county which was prepared by Mr. Robert White, who is an abstractor, I believe, in Rio Blanco County, which shows that virtually all of the shale lands in Rio Blanco County have been filed on during this 22-month period, with some overlap of the pre-1920 filings, but the recent filings are very clear.

Now, much the same thing, I am told, has been going on in other shale oil counties in Colorado, Utah, and Wyoming. I did not have the time nor resources to make a trip through all these other counties, not even in Moffat, which is, I believe, just north of Rio Blanco. And so I can only speak of what I definitely know and have seen. I suggest, and indeed I urge, that this committee send agents into these and other counties to verify my statements, and to see how extensively these filings actually are.

I must admit I was shocked by this discovery, for if these claims are ultimately validated and patented, then hundreds of thousands of publicly owned acres which are worth in the trillions of dollars, and on which the American public could ultimately collect—and I use the words ultimately rather than immediately—hundreds of millions of dollars from leases and royalties, that this great resources may be taken over by a few. Gentlemen, enormous sums are at stake.

Now, it should be noted, as Senator Allott brought out yesterday, Mr. Zweifel and others are ostensibly filing for minerals rather than for oil; namely, for dawsonite from which they will derive aluminum, nahcolite which has sodium in it, and incidentally silver. He throws in a few silver claims, too. But under the mining, crushing, and retorting process which is the present conventional process, it would be impossible to extract these minerals without also extracting the oil. Under this process the two, oil and minerals, are bound up together, and Zweifel and any principals which he now may have or may have in the future will almost certainly inherit the oil if they take over the minerals.

I am aware of the fact that the Mineral Act of 1872 unfortunately does not limit the number of mineral claims upon which a man can file. But I am sure that this act, written at the time of the individual prospector, with a mule and a wash pan, so to speak, was never intended by the people who passed this act to be so interpreted that a few men could corner the great natural resources of the Nation, and take over for themselves hundreds of millions of dollars of publicly owned resources.

Mr. Chairman, I believe that it is the natural heritage of the American people that these great resources belong to the Nation and to the people of the United States. Someone referred obliquely yesterday to this as being the doctrine of Karl Marx. I think it is the doctrine of the great conservationists of this country, beginning with Theodore Roosevelt, who laid down his program in the Conservation Congress of 1909. For some months in 1930 I worked with the great Governor of Pennsylvania, Gifford Pinchot, and I know this was his doctrine, and I know Tom Walsh, the great Senator from Montana, and Burt

Wheeler believed in this, and Bob LaFollette. I do not have to go to Karl Marx to get support for this. It is deep in the American heritage.

But faulty as the 1872 law is, I believe that under it the Zweifel claims and other claims are basically phony and fraudulent. In the first place the law of 1872 requires that the four corners of each claim should be staked out as and when it is located. If you will examine the Zweifel claims, you will find that the uniform pattern was for him to state that he had located 31 or more quarter sections in a day. He would file on about 8 square miles a day and claimed that he had located them.

Now I submit that it was a physical impossibility for any man to walk around each one of the 31 quarter sections and stake out each one of the corners.

I would like to call your attention to a section of the mining law, title 30 of the United States Code, paragraph 29, which treats this requirement. It states that:

A patent, if and when granted, must show that the boundaries of the claim or claims which shall be distinctly marked by monuments on the ground, and shall post a copy of such plat, together with a notice of such application for a patent, in a conspicuous place on the land embraced in such plat previous to the filing of the application for a patent and shall file an affidavit of at least two persons that such notice has been duly posted.

Well, I doubt whether that notice has been filed yet.

Now, it would have been impossible in that length of time to have staked out these claims on level ground in the summertime. It is even more obvious that it would be completely impossible in the heart of the Rockies or the western slope of the Rockies. No mountain goat could have done that nor could Hercules himself or Centaur, half man and half horse.

If you will look over the index of the Zweifel claims in Rio Blanco County, you will find that many of them were filed in December 1966, January, February, and March of 1967. This is skiing season in the Rockies, not springtime in the Rockies, about which the songwriters have sung, but skiing season. The snowfall is very heavy. I found that in one case he filed claims on 31 quarter sections and stated that he had located them on January 23.

I tried in Denver to get the reports of the weather bureau as to what the climatological conditions were on January 23, 1967, but I was unable to find that. I am sure the members of this committee can do so.

The absurdity of a man stating that he had staked out 31 quarter sections going around, putting stakes down at every corner on the 23d of January in the heart of the Rockies just passes human comprehension.

The second requirement of the 1872 act is that the claimant should have made a bona fide discovery of the mineral that he is claiming. It has been ruled, I believe, by the courts that the discovery should be sufficiently definite so as to assure a prudent man that he would be justified in going ahead with extracting the mineral—the principle of the prudent man, which Justice Holmes always said was the basis of the common law.

The third ultimate requirement is that a total of \$500 in labor and/or improvements must be spent on each claim within a 5-year period.

Now I would like to ask: How can Mr. Zweifel maintain that he made a genuine discovery on each and every one of the 2,577 claims in Rio Blanco County and the some 330 claims in Garfield County? If he tells the truth that he has filed a total of 20,000 claims, how can he claim—how can he assert that he has made a genuine discovery on each and every one of them?

It is true that in a considerable percentage of cases the oil is embedded in shale high up on mountainsides, possibly visual laterally, but in a large percentage of the cases the oil shale is located hundreds of feet underground, in some cases as much as 1,200 feet. Could Mr. Zweifel defy the solidity of the Rockies and penetrate to such great depths? Is he a buck who could move to the end of the earth, and go through solid matter?

Now, Mr. Chairman, and members of the committee, I submit it is dangerous to allow these claims to go unchallenged. I am glad Secretary Udall, to the best of my knowledge, has not patented any shale oil claims. I want to commend him for that. Would that other Secretaries of the Interior before him had been similarly restrained. I personally feel confident that he would never approve a single one of the Zweifel claims. I believe that the Secretary is a splendid public servant but he will not be Secretary forever. Other and weaker men may follow, as Albert Fall succeeded Franklin D. Lane.

If these claims were to go unchallenged for years, it would be hard to challenge them later on the grounds of failure to stake, failure to discovery, and failure to improve.

I therefore hope that this committee and the Department of the Interior will actively challenge the Zweifel claims and that they will do so very soon. I suggest, and indeed I urge, that this committee almost immediately send out staff members to Colorado, Utah, and Wyoming and check the Zweifel findings, to see that I have been saying about those two counties is correct, and to include other counties to the same scrutiny—Moffat County, counties in Wyoming, and counties in Utah—and that then the Department of the Interior be furnished with sufficient funds to attack it.

I believe they should be attacked, and attacked as a whole, since if they are taken up one by one, which I understand some have been urging, the legal processes will take forever and a day, and I literally mean forever. Individual claims would simply be gnawing at the edges of these 20,000 claims that Mr. Zweifel says that he has filed.

Just as Zweifel moved on a bold scale to take over the rich treasures of the American people, so I submit must we be bold in their defense.

The CHAIRMAN. Senator Douglas, I must say that in my judgment you have rendered a great service by calling to the attention of the committee the problem that you have related here this morning. I think this is obviously a very serious matter.

The staff has checked through our files and there is a letter here from Mr. Zweifel of February 8 and a subsequent letter of August 21 of this year, and in his February 8 letter he has stated:

We have filed some 3 million acres of mineral mining claims over mineral deposits which we have found to occur in association with the oil shale strata in the three states of Wyoming, Colorado, and Utah. There has been some speculation by the news media that the legal status of these claims may be reviewed by your committee, and we request herewith permission to enter in the record our position with reference to the aforesaid project.

I must say that this poses a real problem, of course, in connection with the integrity of the development of this whole matter of oil shale. If the committee wishes, I think it would be helpful if we heard from Mr. Barry now, a general statement in response to the comments that you have made, and then we can ask questions of Senator Douglas.

Mr. DOUGLAS. May I first say that I have never seen Mr. Zweifel, but he is an extraordinarily frank man. In fact from his frankness I find him most engaging. He wrote one letter—I do not know that I should be privileged to introduce it—where he says, “I hold up to a half interest in the 4 million acres which we have claimed. Ramparts accused me of stealing the 4 million acres which is not quite true. They do not have reason for thinking so.”

Then he writes to the man who is sending the letter, “Anyway you are free to quote anything I have written and say.”

I have formed an admiration for him as I would for Captain Kidd or Henry Morgan. I never heard of such a fellow and he should be given an “A” for frankness at least.

The CHAIRMAN. Very good.

Mr. Barry, why do you not make a statement now?

STATEMENT OF FRANK J. BARRY, SOLICITOR, DEPARTMENT OF THE INTERIOR

Mr. BARRY. All right.

The CHAIRMAN. I think it would be helpful if you could make a general statement at this point.

Mr. BARRY. I hope I can be helpful, and I think to put this matter in proper context it would be important.

It might be said that there is a crime that is involved, and the crime is that literally the law permits what Mr. Zweifel is doing. It is really not necessary that a miner or a prospector have a discovery when he locates a claim although the statute says so. The cases have held that it is not necessary that he have a discovery at that time. Although as against the United States his claim is not valid, still to keep peace in the mining camps in the early days—that is the reason that is given by the courts, by the way: in order to prevent gun battles, to effect dispossession by one miner or another, and then have the disseizor justified in his conduct because the man who was holding the property had no discovery at the time—the courts have held that if an individual locates a mining claim on which he does not have sufficient evidence to qualify for a discovery, he will be protected in his possession against any other person who seeks to displace him.

That means that he is not a trespasser. Indeed the statute itself, which is the 1872 act now, passed nearly a hundred years ago, and the statute which applies to the claims Mr. Zweifel has filed, is an act that invites the public to enter upon lands of the United States. Let me read section 22 of title 30 of the United States Code, as follows:

Except as otherwise provided, all valuable mineral deposits in land belonging to the United States, both surveyed and unsurveyed shall be free and open to exploration and purchase and the lands in which they are found to occupation and purchase by citizens of the United States and those who have declared their intention to become such under regulations prescribed by law and according to the local customs or rules of miners in the several mining districts so far as the same are applicable and not inconsistent with the laws of the United States.

You can locate a claim through an agent; corporations can locate claims, and as we know, corporations do not have two legs and burros to carry themselves out to locate claims; they use agents.

As far as we know, no one claim, no particular claim, let me say, filed by Zweifel was illegal. It is very unlikely that 31 claims could be located in that weather on 1 day, but we cannot challenge Mr. Zweifel and upset whatever rights he may have by simply an assertion that it was too cold on that day to locate a particular claim.

The CHAIRMAN. When the person is filing or reporting the claim does he sign an affidavit that he has done so and so?

Mr. BARRY. No, he files a location notice.

The CHAIRMAN. What does that entail?

Mr. BARRY. Unfortunately I do not have a copy. Perhaps Senator Douglas does.

The CHAIRMAN. But it is not sworn to.

Mr. BARRY. It is not sworn to, but it would involve—if there were any misrepresentations in it it would involve a justification of a charge of fraud.

Now, some location notices that I have seen have alleged that the locator has made a discovery. Well, we find, at least I have found in my experience—and I spent over a year in mining country among miners where I located claims and worked in mines in my youth—I found that miners are among the most optimistic people in the world. They may have spent everything they own, and be living on relief or something like that, but they have almost 100 percent confidence that the next round of shots that they explode in their mine is going to disclose the bonanza they have been seeking. Such people are attracted to this kind of industry, as indeed when you consider the rewards that would be available to someone, if he did hit it rich, you can understand that they are really not insane, just optimistic, that is about it.

Some people have really struck it rich and there are some remarkable cases of men who lived in poverty all their lives and just scraped along and, disregarding the advice of geologists and experts, have gone out and done something and stumbled on great wealth. We know it and we are all from the West, most of us in the Interior Department are.

The CHAIRMAN. Am I to understand that you are not describing Mr. Zweifel?

Mr. BARRY. No, no, I am not. As a matter of fact, I find it a little embarrassing to find the first occasion I ever appeared in public with Senator Douglas, I am opposed to him, and—or not opposed to him, but I am at least debating with him and at the present time that I am aligned on the side of Mr. Zweifel.

The CHAIRMAN. You are speaking legally.

Mr. BARRY. That is right. I think we have got to challenge Mr. Zweifel.

The CHAIRMAN. I am trying to help you out.

Mr. BARRY. Yes. I think we have got to challenge Mr. Zweifel's claims one at a time. We do not know—

The CHAIRMAN. It is going to be a long contest.

Mr. BARRY. I know he might have been able to locate one valid claim on one of those days. Which claim did he locate which is valid? Which is not? We cannot sit here in Washington and write on a slip of paper that it was too cold and it was too snowy for him to locate

a particular claim and therefore the location in the northwest quarter of section so-and-so is invalid. We must go out and see: Are the notices posted? Is there a sign of a discovery? Who are these people who located the claim? We must challenge not only Mr. Zweifel, whose name appears on the location notices, but all of the other people who signed it. Some of them may have acted in good faith.

Mr. DOUGLAS. May I interject a minute?

In response to a question by Senator Allott yesterday about the other claimants, every claim that I have found—I have checked several hundred of them—his wife and daughter were coclaimants. I do not know which is which, but one Bonnie E. Zweifel and Maude H. Zweifel are always on the claims. There are others of varying numbers, but on the quarter sections he would have a total of filings in which he and the members of the family were three, and four others, generally the same four, but sometimes varying from one set of claims to another.

Senator ALLOTT. Let me say, Senator, I do not know whether you understood the import of my question yesterday or not, but the claims that I was speaking about have no relation whatever to the Zweifel claims.

Mr. DOUGLAS. I see.

Senator ALLOTT. In fact, I do not know Mr. Zweifel or have any more connection with him than you do.

Mr. DOUGLAS. I see.

Senator ALLOTT. And the claims I was speaking about are completely independent and were based on exploratory permits—

Mr. DOUGLAS. Yes.

Senator ALLOTT (continuing). Previously granted by the Department. Mr. Barry knows about those.

Mr. BARRY. Yes. I am familiar with those.

But speaking of Zweifel, let me say this. First of all I just want to lay a little foundation in the record here. I have given the section number in the code. Let me read just a few words from the Supreme Court decision of Mr. Justice Sutherland in 1930, in *Wilbur v. Krushnic*, 280 U.S. 306. In this case the Government canceled a mining claim for failure to perform assessment work. Assessment work worth \$100 per year is required to be performed on each claim in order to retain the possessor's right to possession as against—mind you now, referring to the *Virginia-Colorado Development Co.* case that Mr. Douglas referred to—as against another, a third party.

The *Virginia-Colorado Development Company* case, held the United States cannot challenge a claim for failure to perform assessment work.

We challenged Mr. Krushnic in 1922 and we alleged that while he had done the assessment work for 1921 and 1922, he had failed to do it in 1920, and we lost the case in the Supreme Court. The Court said:

The rule is established by innumerable decisions of this court and of state and lower federal courts that when the location of a mining claim is perfected under the law it has the effect of a grant by the United States of the right of present and exclusive possession. The claim is property in the fullest sense of the term and may be sold, transferred, mortgaged and inherited without infringing any right or title of the United States. The right of the owner is taxable by the state, and is real property subject to the lien of a judgment recovered against the owner in a state or territorial court.

In the case of *Cameron v. United States* 252 U.S. 450, Justice Van Devanter held—

That the Land Department has no power to strike down any claim arbitrarily, but so long as legal title remains in the government it does have power, after proper notice and an adequate hearing, to determine whether the claim is valid and if it is found invalid to declare it null and void.

I want to point this out that, with respect to any one of Mr. Zweifel's claims or of the claims of his various associates, we must find the claim, make a bona fide assertion in a contest within the Department, that there are grounds justifying its cancellation, and give him notice and an opportunity to be heard so that he will have due process of law. As valuable as I regard the resources of the United States to be, I think the principles our Constitution guaranteeing due process of law to an individual, to be more important. At that time, if evidence can be produced that supports the validity of the claim, we are under a legal obligation to recognize it and we will accept its validity as long as I have anything to say about it. If we find that it is not a valid claim, we will take such steps as may be necessary to have it declared null and void by the Government and canceled, and we will pursue Mr. Zweifel and anyone else who tries to occupy and use the claims until we have assured the rights of this resource to the United States.

Now, Mr. Zweifel has had a checkered career. He has been in this business for some time. I am quite sure he does not deny that he was convicted at some previous time of mail fraud. I do not know anything about the merits of the case, and I am not bringing this up to use against him but to point out that notwithstanding that we intend to see to it that he along with any other claimant in the public lands gets due process.

We have had investigations made and these are—let me summarize in a nutshell—I am not free to turn over the investigations, but I can quote a conclusion from a number of interrogations that were made.

This is a summary of the investigation: He has given no assurance to anyone of the existence of valuable minerals. The amounts that have been paid to him have been minimal and have been consistent with the amounts of money that he had to pay to record claims and buy location notices, and that sort of thing. The payments have been nonrecurring. His interest in the matter apparently is to give himself an interest in the claims if they should turn out to be valuable. He has agreed to bear his share of the development costs and he has not assessed any to others. The funds have been advanced to Zweifel by persons who advanced them for expenses of recording and are considered pure speculation by them, and his desire to obtain a patent or his intention to obtain a patent is entirely secondary. His primary purpose is to be rich.

Incidentally, he filed a group of claims on the Outer Continental Shelf for whatever value they might have had just before the last sale off Louisiana, the one alluded to yesterday.

The CHAIRMAN. Does he hope to have someone come in and buy him out?

Mr. BARRY. I do not know. There are all kinds of motives. I cannot attribute them to anybody. The Bureau of Public Roads finds that

locations are made in their path just as soon as it is decided that they are going to build a highway.

The CHAIRMAN. He certainly is casting a cloud, shall we say, on the title to property.

Mr. BARRY. Well, I think—

The CHAIRMAN. In this case property of the U.S. Government.

Mr. BARRY. I think I could make this statement without fear of successful contradiction, and that is that Mr. Zweifel, while he may not be a criminal, and I doubt it from any evidence we have that he is, he is a complete nuisance. But I do not know that we can do anything about it.

Mr. DOUGLAS. A very astute, able man.

Mr. BARRY. He may be, but he is a nuisance because we are going to have, as Mr. Douglas here has stated, we are going to have 20,000 claims to deal with.

I have looked at this problem and I know it is a problem. At the present time we have all of our lawyers assigned to this kind of work in Denver, actively engaged in mining contests involving the earlier claims. The matter has been underway for months. The trial is actually going on in the Department now.

The CHAIRMAN. How many people do you have out in the area to check on the validity of claims?

Mr. BARRY. I can answer for my office. I have four lawyers in the regional office of the solicitor in Denver who are engaged in this work. That office also takes care of the Chief Engineer's office, Bureau of Reclamation, of all of the other public land problems, the Indian problems, and so forth, the other departmental problems in that area, and we have got four men.

I am not claiming that we are not doing all right; we are doing our routine work with the staff out there, and I am not making any requests for people for that, but if I have to put men on 6,000 or 8,000 or 10,000 claims when there are probably millions of claims in the West that have never been contested, and will never be cleared until they are, if someone wants to stand up and challenge them, why I just do not have the people to do that. I do not think it would be economical.

The CHAIRMAN. I understand you have only one mining geologist at the Denver office; is that right?

Mr. BARRY. I would not be in a position to answer that. I would very much doubt it. We have in the Department of the Interior, in the Bureau of Land Management, seven hearing examiners, and they handle desert land claims, mineral lease matters as well as mining claims, and all of the other adjudicative matters that go on in the Department of the Interior exclusive of Indian matters. These men are stationed in Denver and in Salt Lake City and are sent around to conduct these hearings. But just like any lawsuit it takes a long time to try one.

Let me say something about these astronomical boxcar figures. As to most of the claims Mr. Zweifel has reported to locate and we have a file here of his papers to indicate when he was engaged in this activity and what he was representing, and so forth, he said there is aluminum in that oil shale out there and it is in this dawsonite.

Dawsonite is sodium aluminum carbonate. His claims from a substantive point of view cannot be taken seriously because since 1920 all carbonates of sodium have been leasable and are no longer locatable. Also, if we are challenging a claim, on the date of the challenge or the date of the hearing it is determined as to whether he has a discovery. The deposits of dawsonite are between 1,600 and 2,000 feet deep and we know very well Mr. Zweifel is not going to be able to produce evidence that on the day that we challenged the claims or that we issued the withdrawal recently, he had punched a hole in each claim and drilled down to expose this aluminum that is supposed to be in the oil shale down below 1,600 or 2,000 feet. We do not take the claims seriously as mining claims. But we say that we are going to have to contest them.

The question of whether dawsonite is a locatable mineral or a leasable mineral may eventually be determined by a court, but it only has to be decided once, and when it is decided I suspect that all those who are holding claims which are dawsonite claims will have nothing, and we probably will not even bother to contest them any more than we will file contest against Mr. Zweifel for locating claims on the Outer Continental Shelf. We probably will not contest those claims either. We'll just ignore them.

However, if Mr. Zweifel goes out on the Continental Shelf and endeavors to interfere with somebody who has a lease out there, one of our lessees, or if he tries to go out in Colorado and exploit some of that land, we will, of course, take action. At the present time he has got a lot of papers filed in Rio Blanco County and he is a nuisance. I do not think that he is any real threat to the resources of the United States, and I do not think it merits some kind of a ukase ordering that Mr. Zweifel has no valid claims and therefore canceling all that he has done.

THE CHAIRMAN. Mr. Barry, at that point, let me ask you—I was not here at the time Mr. Lynch testified, but I am looking at the transcript. Mr. Lynch, an attorney in Denver, suggested that one approach in connection with these claims is that the Congress might pass legislation providing for a legislative taking of the lands, provided, of course, that the applicant for the claim would have an opportunity to litigate the matter in the Court of Claims.

I want to ask you, is there a property right the moment that someone files on a claim?

MR. BARRY. If he has made a valid location—that is, if he has got a valid claim, he has got a property right. But to prove that he has got an invalid claim requires us to give him notice and a hearing.

THE CHAIRMAN. I understand.

MR. BARRY. So in that sense a citizen who goes on public lands, and has no valid property right against the United States, is entitled to notice and a hearing and this is what is going to take the time. We would establish if we were successful in a contest against any one of the claims—we would establish that he had an invalid claim, and we would therefore order him off. If he did not leave we would have to go back for a second lawsuit because the Interior Department does not have any marshals to go out and enforce our orders. We would have him evicted in a court proceeding. That is exactly what happened in

the *Cameron* case. We challenged the claim and established it was an invalid claim. Cameron ran a livery stable at the head of Bright Angel Trail on the south rim of the Grand Canyon and the Park Service was a little outraged, I guess. So we finally brought a suit in a court to enjoin him from occupying it. It was, in effect, an eviction suit and it was at that time the court said the Department of the Interior had the power to declare a claim null and void and to interpret the statutes.

Now, I agree, incidentally, with something else that Senator Douglas said, and that is that there ought to be some kind of limitation on the number of claims that a person can locate.

In 1872 this act was passed, you know, and this was right in the middle of this period—I was not here yesterday, but somebody alluded to that kind of thing as Karl Marxism—when we passed the Homestead law which had an acreage limitation of 160 acres. In 1877 we passed the desert land law which had a limitation of a half a section. In 1902 we passed the reclamation law which had a 160-acre limitation.

In 1866 the law which was displaced by the 1872 act was passed. In that law a claim could only be 200 feet along the length of the vein, unless you were the discoverer, in which case you could get 400 feet. No person could get more than one claim on one vein. Of course, you could locate on different veins and I presume get more, but that was the 1866 act.

So there was an acreage limitation but I have read the legislative history of these acts and there is no acreage limitation in the 1872 act and there is none in the legislative history, and I have no authority to declare that there ought to be a limitation. Congress has the authority to decide whether there should be a limitation on the number of claims that anyone can locate.

Perhaps a situation such as that which confronts us with Zweifel, where he alleges that he has located 20,000 claims, and we know from the evidence that in one county in Colorado he has located 2,577 claims, Congress might be well advised to address itself to some revisions of that law.

The CHAIRMAN. How could we go ahead with an orderly development of the oil shale program when there is the long series of clouds over titles to lands that may well have rich deposits of oil shale? How could a private investor properly commit capital with that kind of litigation hanging over him? The very fact that Mr. Zweifel has a claim may have some value, because he can delay development and it requires affirmative action by the Federal Government to do something about it. That could become a very valuable asset in Mr. Zweifel's hands, I would think.

Mr. BARRY. I should say I think the companies will generally disregard it; not to say they disregard all claims. They make some kind of an investigation, if they get a piece of land from us. For example, Mr. Zweifel located claims on areas later leased on the Outer Continental Shelf.

The CHAIRMAN. But should we not have—

Mr. BARRY. We got the biggest bonus bids on that property that we have ever had.

The CHAIRMAN. Should there not be legislation making it clear that the Outer Continental Shelf is not open to entry?

Mr. BARRY. It is clear it is not open to entry. It is also clear that you cannot locate sodium carbonates. Here is somebody who has located one. What do you do? In my view it is clear.

The CHAIRMAN. Is there a specific statutory provision that excludes it or is it by interpretation of existing previous law?

Mr. BARRY. Well, just to take this dawsonite situation, dawsonite is sodium aluminum carbonate. Section 161 of title 30 of the United States Code provides that all carbonates of sodium are leaseable, and other sections of the Mineral Leasing Act provide that the only way that you acquire such minerals is under the Mineral Leasing Act.

The CHAIRMAN. What I am saying, in effect, is, Could we not, by legislation, prohibit the local county auditors from recording such claims?

Mr. BARRY. Well, yes; I suppose we could.

Senator ALLOTT. May I interject just a word? I think you are getting off into deep water here. I do not think the Federal Government can do anything which would keep a county clerk, as it is in Colorado—and that is the section that we are talking about now, I do not know about Wyoming—from accepting any instrument that anybody asks to have filed or recorded.

Mr. BARRY. Yes.

The CHAIRMAN. As it relates to Federal lands?

Senator ALLOTT. I still do not think you can do it.

The CHAIRMAN. Well, I am not sure.

Mr. BARRY. The only reason they file it there is because of Federal law. If it did not do them any good to file it there, they would not do it.

The CHAIRMAN. The States have no authority to interfere with Federal property and do anything that would put a cloud on the title, I would think. It would seem to me such legislation would be constitutional. I am relating it only to Federal land, of course.

Mr. BARRY. Just to give an experience of my own, Mr. Chairman, I had a lawsuit one time involving a piece of property in Arizona where somebody went down and insisted that the recorder put an affidavit on the record that he owned the property. It was not a deed. It was not a mortgage. It was not anything in the statute or anything else. Yet the title company would not give me a title insurance policy and I had to quiet title against this fellow because he had put it on the record that he owned the property. The title company was just not going to take a chance.

So I can see even if we were to repeal the law that says it is up to the local laws to decide how you go about locating a claim and if we were to say you will record it in the Department of the Interior, people might still put something on the record. It would not bother us much because we would not have to recognize it for any purpose.

The CHAIRMAN. But why would it not be constitutional for the Congress to prohibit, as we can certainly, interference on public lands? We could prohibit the recordation by the States of any device that would have the net effect of placing a cloud over the title to that property.

Mr. BARRY. Let me say this: There are a few sacred cows in this country and I have run into a few of them in the Department of the

Interior. One of them is section 22 of title 30 of the United States Code which says simply that in 1872 the Congress of the United States said that all of the public lands of the United States or all of the lands belonging to the United States shall be free and open for anybody to go on and explore. At that time in history it was a prudent thing to do. We were trying to fill up the West, the empty land, with people. We were literally giving away our land hand over fist. People did go out. I do not know why they would want to locate a mine when they could get a desert entry, because they needed to pay only a dollar an acre for desert land claims but they paid \$2.50 and \$5 an acre for a mining claim. Apparently many were in good faith in the old days when they said they had mining claims.

Senator ALLOTT. Mr. Chairman, may I ask a question? You referred to dawsonite, Mr. Barry?

Mr. BARRY. Yes, sir.

Senator ALLOTT. Then I assume, since this is aluminum sodium carbonate, that this is subject to approach by private individuals only by way of the Mineral Leasing Act; is that your position?

Mr. BARRY. That is correct, Senator.

Senator ALLOTT. Then as applied to dawsonite or nahcolite, they would constitute a cloud only so far as they had a valid mineral lease, but not by way of a claim.

Mr. BARRY. That is correct.

Senator ALLOTT. Is that your point of view?

Mr. BARRY. That is correct. However, they are not limited by what they say in their location notice, as to what mineral they located. And at the time of the trial, they might come forward with something else. There has been some suggestion that claims were located for silver. I know they have also been located for platinum in this area. We would have a contest and we would have an argument and we would have engineers and geologists, possibly, contesting in a close case with all kinds of evidence and an extensive record and so forth, to establish that there was or was not enough silver or there was or was not enough aluminum to justify this location. We must give those people their day in court as long as the law stands as it is, because Congress has given an invitation and grants them a right if certain facts appear.

Mr. DOUGLAS. Mr. Chairman, may I make a couple of comments? Senator MOSS (presiding). Senator Douglas, surely.

Mr. DOUGLAS. If it be true, as Solicitor Barry has said, that there is no prohibition in the law as to the number of claims that a person can file, and I think he is correct in that, and if it is also true that, by court decisions and by administrative procedure, the Government is effectively stopped from any thoroughgoing challenge of these claims, then I feel like the character in one of Shakespeare's plays when confronted with a legal ruling saying, "The law is an ass," and that is my first instinctive reaction, and I think it is a rather healthy reaction.

The second series of points that I should like to make is that if technicalities are used to tie the Government down as Gulliver was tied down when he went to Lilliput and fell asleep and woke up to find a multitude of little threads preventing him from moving, so the American public went to sleep on these claims.

Now, Solicitor Barry says we are, in effect, so tied down that we cannot move effectively against them because we must take up each one of these claims one by one. So with 20,000 of them, it means that Secretary Udall, in whom I have great confidence, will be out of office long before the first claims are passed upon, long before these other claims are adjudicated.

If technicalities are used to prevent the Government from taking effective action, I think Mr. Zweifel should be called to account on technical grounds and that the burden of proof should be shifted to him. Has he located? Did he make a legitimate location? That calls not merely for putting up markers but some time along the route he has to file on the four corners a statement that he has taken those steps. Has he put up markers on the four corners of 20,000 claims or of 2,577 claims at Rio Blanco and 338 in Garfield?

It stands to reason that he has not, and I submit that the burden of proof should be upon him, that the preponderance of evidence is against him, commonsense of mankind is against him on that score.

What about discovery? Was there a legitimate discovery on 20,000 claims, on 2,577 claims in Rio Blanco, and 330 claims in Garfield County? That is absurd, particularly in view of the location of these claims.

Now, there is a final point that I did not intend to make. I was very careful not to mention the fact that it is my understanding that Mr. Zweifel was convicted of mail fraud and sentenced, I believe, to a term of 3 years. I did not intend to make that because I disbelieve in that sort of statement being made without a man being present to defend himself. But Mr. Barry made that statement, and it is, to the best of my knowledge and belief, correct.

I would like to read, if I may, paragraph 241 of title 30 dealing specifically with oil shale, and I read starting at the bottom of page 6404 and going up to the first paragraph on page 6405:

No claimant for a lease who has been guilty of any fraud or who had knowledge or reasonable grounds to know of any fraud or who has not acted honestly and in good faith shall be entitled to any one of the benefits of this section.

Now, that does not limit the disqualification to frauds perpetrated in connection with a specific claim. It has no statute of limitations applied to it or any area in which fraud is to be considered but not considered in connection with other areas.

I read again: "No claimant for a lease who has been guilty of any fraud"—without specification as to whether it is committed on oil lands or not—"or who had knowledge or reasonable grounds to know of any fraud or has not acted honestly in good faith shall be entitled to any of the benefits of this section."

And I submit that these claims, when you come down to it, can be attacked on that ground.

Mr. BARRY. These are not leases.

Senator ALLOTT. Would the Senator yield at that point? I would like to ask Mr. Barry if his interpretation of that statute would be the same as Senator Douglas'.

Mr. BARRY. No, it would not. He was talking about leases, and this is not a lease. This is a location of a mining claim that would ripen in due course into title and not a lease.

Furthermore, I doubt very much if, after a person has been found to be guilty of fraud, and has paid his debt to society, and is conducting himself in a nonfraudulent way, and I assume that is what he is doing because I have read his letters and he does not say anything that does not appear to be correct and what he intends to do, that is, locate claims. He touches that little nerve that everyone has in his being somewhere that says, "Look now, here is a chance by just spending a few bucks to get very rich. I am not saying you can do it, the odds are against you, but you could."

So that is the kind of a pitchman that he is, and as far as I can see that is not fraudulent. I could not say that because this man has been convicted of a fraud that that invalidates his claim. I am sure it would not.

Mr. DOUGLAS. If I can reply to that, he obviously has been fraudulent in making the claims if he states he has located all four corners of 2,577 claims in Rio Blanco County and 330 claims in Garfield County. If you send your investigators out in the field you are going to find hundreds, if not thousands, of questionable cases. It is obviously a fraudulent statement—and I have gone over the records in two of those counties—if there is a specific claim that they have located these quarter sections on a given day. It stands to reason that they have not located them on that day in view of the topography, in view of the distance to be covered, in view of the snow and so forth. You do not even have to go back into his past record on this point. We gave him great privileges; do we not have the right of self-defense? Must we sit back and allow the public domain, the domain of the people of the United States, to be plundered?

Mr. BARRY. I can agree that he did not locate 329 or 330 claims by putting stakes in the ground or otherwise marking the corners. I said 330—that was the figure that Senator Douglas used—but he might have located one of them, and could have located all 330, because you can do this through agents, which is perfectly legitimate. He could have had that country covered with agents to do it, so the 329 might be invalid or valid, but which one is valid—which one can I say is invalid?

I have got to show—I have got to go out and find out—first of all were any of the stakes put in the ground, were any marked at all? Is there any discovery?

So, we will send someone out from the Bureau of Land Management who is a geologist or mining engineer and he will look and make a report and turn it back to us, and we will turn it over to the lawyer in my office and the lawyer will file a contest. In many, many cases the parties who are served do not even show up because they did not have a claim to start with.

Senator Moss. Well, is there not any legal method open to you where you can shift the burden to him to show positively that he located these claims?

Mr. BARRY. Yes; I think so. I think that he has the burden—he says in his location certificate; he says it in his patent application; he says that he located and staked a claim on a certain day, and he complied in all respects with the law, and then we go out and we look. Then if we file a contest we first put a witness on to make a

prima facie case. Usually that is the geologist who says, "I saw the ground, there are no diggings on it, there is no ore exposed, I did not find the monuments, there weren't any monuments up. I went to all the places referred to in the location notice or patent application and I didn't find anything there, and, therefore, I recommend against his getting a claim."

That is what the geologist says. He gets on the stand and he testifies to that effect.

Then the claimant is entitled to put on his evidence that "I was there on a certain date, I had erected the monuments. If they are not there, somebody knocked them down."

Senator ALLOTT. May I inquire of the Solicitor just a moment? Mr. Barry, have you reached such a place in your thinking and study of this matter that you have any recommendations of directions in which Congress might proceed in order to clear this matter up?

Mr. BARRY. No; I think I could not do that because the matter has not come up in the Department of the Interior, and I would have to have the advice of the other agencies.

I would like, however, to comment on the statement that Mr. Lynch is reported to have made yesterday. He suggested that there be a legislative taking.

Senator ALLOTT. Yes; that is what he did.

Mr. BARRY. All right.

Now, that is one way by which you could, let us say, take away the speculative expectations and so forth of the people who are claimants right now in order to clear up this land so that we could go forward with our program.

There are disadvantages in it. For one thing, Congress has traditionally left these matters for the determination to our Department, the Land Department. This is a department which over the years has acquired an expertise, a tradition, a literature, and everything else that makes it particularly well equipped to determine whether a claim is valid or not, to judge the validity of mining claims and their conformity with the law.

To leave this matter to the commissioners of the Court of Claims would be giving it to people who did not have that expertise. This is an "administrative tribunal" sort of situation. You could have the legislative taking by saying that the Department of the Interior should determine whether the claim is valid, and then allow the claimant to go to the Court of Claims if his claim has been declared valid to have a determination made of its value. He would recover that amount from the United States in the Court of Claims.

The disadvantage of that approach is that it would not save any money, because we would still have to make this determination of validity or invalidity. We would still have to give him his day in court. We would still have to have the hearings and experts and the examinations and so forth. I really do not think it shows any promise of a successful operation.

Mr. DOUGLAS. Mr. Chairman, may I make another comment?

Senator MOSS. Yes, Senator Douglas.

Mr. DOUGLAS. I do not want to get into a debate with Mr. Barry here. He said on the one hand that the Bureau of Land Management

is adequate to deal with these matters and it should not be taken away from them. And then he made the statement that he had only four men in the Denver office who passed on all these matters. What I would like to suggest is this: If he says he cannot attack 20,000 claims at once, let him go into the Piceance Basin and take action on the claims of Rio Blanco and Garfield Counties, which are the richest, as far as the oil shale is concerned, in Colorado. Let him go in there and make a frontal attack. Let him hire 30 attorneys; let him hire engineers. There are literally millions, possibly hundreds of millions, possibly trillions of dollars at stake. This should be done instead of more or less supinely—forgive me for saying that—allowing these claims to go by default, with no challenge.

I will be glad to go out there with anyone. You could get a group down in Green River and go from county to county, and photostat the documents.

Senator Moss. There is the tough problem. Any recommendation of the committee as to what we might either recommend to the Department or, as Senator Allott was trying to elicit, any recommendation as to what we might do legislatively—

Mr. DOUGLAS. Yes.

Senator Moss (continuing). To break this impasse, we would like to know.

Mr. DOUGLAS. The difficulty with legislation—the difficulty with amending the law of 1872 and placing a limit on the number of claims a person can file is locking the door after the horse has been stolen.

Senator Moss. Right, ex post facto.

Mr. DOUGLAS. Virtually all of this land has been claimed. As I used to go out by plane or train through this territory on the way to California I would say, "Nobody is ever going to claim this. This will always be Government land." But now it is claimed.

Mr. BARRY. Well, now, if Senator Douglas can persuade a majority of the House and of the Senate to give me 30 lawyers, I would have no difficulty in assigning them to tasks in connection with attacking these claims, and I am sure I can do it much quicker than with my present staff. I sincerely believe—and I have studied this matter, and I think I understand what the mining law is and what the particular problem in this area is—that this would not be a prudent expenditure of money. I think a very large number of these claims will never be advanced seriously at any point. I think we probably will have to run a contest through on the issue of whether dawsonite is locatable and, once that has been decided by the courts, anyone who has a dawsonite claim is going to throw it in the wastebasket. We are not even going to bother contesting it. Any company that wants to lease will go ahead and spend is money and not worry.

Senator Moss. Can we not get that started right away?

Mr. DOUGLAS. One final remark if I may. These claims are contiguous, quarter sections side by side. Why cannot 200 to 300 filings at once be attacked?

Mr. BARRY. We could.

Mr. DOUGLAS. There is a court of public opinion, you know, in this business, as well as an administrative court, and the district and circuit and supreme courts of the land. This case will be tried in the court of

public opinion, and I hope it will be tried with good information and on the basis of action. I would hate to see the department take this—well, I want to be guarded in what I say—I would hate to see it take a supine position.

Senator ALLOTT. Mr. Chairman.

Senator MOSS. Senator Allott.

Senator ALLOTT. May I make an inquiry?—and I do this not in any way trying to diminish in any sense the questions raised this morning, because they are serious questions—but we also have a long list of witnesses, some of whom have come a long way, and who have been in constant attendance at these hearings for 2 days, who wish to testify upon the direct question of the regulations which have been promulgated and whether or not they are reasonable in anticipation of developing a viable oil shale industry. This also touches it, and I agree to that. But, in view of the convenience of these other witnesses, I would like to inquire, since it is now 12:30, when the chairman plans upon adjourning and when we could get on with hearing some of our other witnesses?

Senator MOSS. It is the plan of the Chair to recess just as soon as we have completed this present discussion with the witnesses and we will reconvene promptly at 2 o'clock and proceed with all deliberate speed to hear our remaining witnesses. We do have several very important witnesses yet to hear.

Mr. DOUGLAS. May I say, Mr. Chairman, it was my original intention not to testify before this committee. I thought I would leave the testimony to Mr. Lynch, who accompanied me, and Mr. Freeman and Mr. Spencer Smith. I tried to occupy an inconspicuous place in the hearing room yesterday. I testified only at the request of the chairman and not at my own solicitation. I do not think I took up as much time as the preceding witness, but I am very glad to stop now.

Senator MOSS. Let me say we are very grateful that you have testified, Senator Douglas, and what you have presented here is of overreaching importance in this whole subject, no question about it. You are taking an interest in this problem and making investigations at your own expense. This has given us great insight and information with which to work, and I think it has highlighted it again before the forum of public opinion that we were talking about. So we are very grateful, and we do appreciate your comments. We do not mean any inference at all that we are not entirely grateful for your appearance.

Mr. DOUGLAS. Thank you very much.

Senator MOSS. I think Senator Hansen had a question.

Senator HANSEN. Mr. Chairman, I have listened with a great deal of interest to what has been said here. I would like first of all to pay tribute to your great energy and your evangelistic spirit. I think you have demonstrated a continuing interest in the vitality in government which certainly establishes you as a very unusual person, Senator Douglas, and I want to compliment you for your interest and motivation that prompted you to go out to Colorado.

Mr. DOUGLAS. You are very kind.

Senator HANSEN. I would like to say to Mr. Barry, first of all, that I want to pay tribute to your very commendable defense of the due process theory that you have enunciated here this morning, I think,

with great clarity. I would say that as we talk about these leases that have been filed one over another on this Green River Plateau, I think we must bear in mind that there are a number of claims that have been filed on top of leases that have been filed that I think are made in perfectly good conscience and for very clearly understandable reasons. I would refer to an article—and if I may I would like to have it inserted at this point in the record, Mr. Chairman—appearing in the Mining Congress Journal that was written by Russell G. Wayland. He is the chief of the Conservation Division of the U.S. Geological Survey, and in that article entitled “Is the Mineral Locatable or Leasable?” he goes on to discuss this thing, and I think we can certainly understand why a number of people, interested in the minerals and in the kerogen in the Green River Plateau, would have reason to wonder how they might best protect their valid and legitimate interests.

I would also like to say, Mr. Barry, that I was not aware until this morning that it was your opinion that all carbonates of sodium were leasable. I thought this was still in the limbo of undecided questions, and I am pleased to know that is your opinion. I think it helps clarify a maze of complicated questions and out of which has grown a whole thicket of legal questions that do superimpose a lot of difficult legal tests in this Colorado plateau area.

I gather from what you say that it is your opinion that this question was resolved with the passage of the Mineral Leasing Act in 1920, and that these minerals are leasable.

Mr. BARRY. That is correct.

Senator Moss. Without objection, that article will be printed in the record at this point.

(The article referred to follows:)

IS THE MINERAL LOCATABLE OR LEASABLE?*

(By Russell G. Wayland, Chief, Conservation Division, U.S. Geological Survey)

(Classification is a key to the question of whether a mineral is leasable or locatable. In determining whether or not a given mineral deposit comes under the mineral leasing acts, one must be aware of Congressional guidelines and their application to problems arising as new technology or successful exploration bring forth new leasable industrial minerals.)

In the public mind, with an assist from Hollywood, the only mining law is apt to be that law which evolved from the gold and silver discoveries in California and other western states a century ago. This is the General Mining Law (30 U.S.C., Ch. 2), which is concerned with lodes, fissure veins, and placers. The law provides for mining claims which are “located” on mineral discoveries made by “prudent” men, who may then patent those mining claims and obtain fee simple title to them. Sometimes overlooked is the fact that other mining laws, now half a century old, repealed the lode and placer mining law as to named minerals in the public domain, and made them subject to leasing rather than location. This article examines some aspects of the distinction between the named leasable minerals and the still locatable minerals. Excluded from the discussion are minerals in federal lands acquired by purchase or transfer from state or private ownership. Also excluded are common mineral materials such as sand and gravel in public lands.

GENERAL MINERAL LEASING ACT PASSED IN 1920

In the first half of the nineteenth century the federal government's prime objective in the West was to promote settlement. Most lands of the public domain

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were offered for \$1.25 per acre without reservation of their minerals, although school sections were supposed to be nonmineral. Reservation of minerals by the government began nominally with a provision in the Homestead Act of 1862 that mineral lands were not liable to entry and settlement. In the same year Congress provided that railroad land grants were to be for nonmineral lands, with the exception of coal and iron ore lands. Preliminary mining legislation dates from 1866 (30 U.S.C., sec. 21).

The mining law, as passed May 10, 1872, was clearly written around metalliferous lode and placer deposits. Thereafter, Congress from time to time authorized the acquisition of some nonmetallic minerals including petroleum and salines under the placer provision of the mining law of 1872. However, coal was always an exception, beginning with the act of March 3, 1873, which concerned the sale of coal land.

In 1905 and 1906 it was disclosed that many large areas of coal land in the public domain had been obtained fraudulently through agricultural entries rather than by purchase as coal lands. Thereupon, President Theodore Roosevelt directed the Secretary of the Interior to withdraw all remaining coal lands from entry. The Geological Survey identified these lands, and they remained withdrawn under executive order until withdrawal legislation was forthcoming in 1910. At that time Congress also provided for agricultural patents to coal lands, but with reservation of the coal to the United States.

In 1908 President Roosevelt held a governors' conference on conservation during which several speakers called attention to the importance of phosphate fertilizer for depleted soils, noted the export of Florida phosphate to Europe, and suggested withdrawal and reservation of our western phosphate fields. The Geological Survey had identified most of the lands, and the withdrawal was done promptly. Oil and gas structures in conflict with agricultural entries were begun to be withdrawn at about the same time, and in 1913, potash and associated saline lands were also withdrawn in aid of legislation and for classification. A 1914 act opened the withdrawn or classified lands to agricultural entry subject to reservation of these fuel and fertilizer minerals. The first leasing act came in 1917 (potash) and the General Mineral Leasing Act was passed in 1920. These acts and their later amendments repealed the mining law of 1872 as to the named leasable minerals and lands valuable for them.

LEASABLE MINERALS NAMED

The leasable minerals in public domain lands named in the various mineral leasing acts as amended over the years are coal, oil, gas, and oil shale; phosphates, or phosphate rock; chlorides, sulfates, carbonates, borates, silicates or nitrates of potassium and of sodium; sulphur in Louisiana and New Mexico; and native asphalt, solid and semisolid bitumen, and bituminous rock (including oil-impregnated rock or sands from which oil is recoverable only by special treatment after the deposit is mined or quarried).

The foregoing tabulation, taken directly from codified law, is not stated in mineralogical textbook language. We must go behind the law to the legislative history and the Department's constructions to understand the meaning of some of the terms.

MANY REASONS LED TO ENACTMENT

Three major leasing bills for fuels and fertilizer minerals were introduced in the Congress before potash was separated in 1917 for immediate enactment. All provided terms and conditions which would prevent the establishment of monopolies, insure competition, provide for continuous working of deposits under lease, discourage the holding of lands for speculative purposes, protect the prospector's investments made prior to actual discovery of a valuable deposit, insure enough acreage and mineral resources to justify plant investment, and provide for proper operation and prevention of waste. Of these, the legislative history shows that the major reasons leading to enactment of the mineral leasing laws involved the desire to prevent development of monopolies, to discourage holding without development for speculative purposes, and to provide for continuous working of the deposits. An instructive statement along these lines, concerning western phosphate, appears in House Committee Report No. 688,

63d Congress, 2nd Session, May 12, 1914, favorably reporting on H.R. 14094, the first major leasing bill introduced in the Congress.

In another sense, the reasons advanced for the rejection of the system of location under the mining laws and the introduction of a leasing system for the minerals named in the 1917 and 1920 acts were concerned with these minerals as fuel and fertilizer minerals. The public and the Congress believed that existing laws governing the use and disposition of the public lands, including the mining laws, were inadequate to insure general use of fuel and fertilizer minerals at reasonable rates. As noted, vast areas of the public lands containing these minerals had been withdrawn from entry several years before the first major leasing bill was introduced in Congress in 1914.

CLASSIFICATION IS KEY

The director of the Geological Survey has the authority and responsibility, under the Act of March 3, 1879 (43 U.S.C., sec. 31) as supplemented by the Reorganization Plan No. 3 of 1950 (5 U.S.C., sec. 481, note) and Secretary's Order No. 2563 (15 F.R. 3193), to classify lands as valuable for the leasable minerals in order to retain the mineral rights in federal ownership. He also has the authority and responsibility, in the first instance, of determining for the Department which deposits are subject to the leasing provisions and those which are subject to the prospecting provisions of the mineral leasing acts.

This classification function is a key to the question raised by the title of this article. This is because the leasing acts, i.e., the Mineral Leasing Act of 1920 (30 U.S.C. 181-287) including the Potassium Leasing Act of 1927 (30 U.S.C. 281-287) and its predecessor, the Potassium Leasing Act of 1917 (40 Stat. 297), repeal the General Mining Law (30 U.S.C. Ch. 2) as to minerals named in the leasing acts. Such minerals are no longer subject to location but only to lease (Wilbur v. Krushnic, 280 U.S. 306, 314 (1930)).

Implicit in the authority and responsibility of the director to classify lands as valuable for the leasable minerals is the responsibility, in the first instance, of determining whether or not a given mineral deposit comes under the mineral leasing acts. For most deposits this poses no particular problem and raises no questions. In general coal is coal, and oil is oil, and salt is salt. However, natural and civil laws are not always easily reconciled. Some reconciliation was undertaken by the Congress in the process of considering and enacting the mineral leasing laws, and these guidelines are most instructive. The balance of this article consists chiefly of a review of these Congressional guidelines. Some examples are given of their application to problems arising as successful exploration or new technology bring forth new leasable industrial minerals, unknown or without value when the leasing acts were passed.

POTASH FIRST LEASABLE MINERAL

It is instructive to concentrate on potash because it was the first leasable mineral, its law was reviewed and amended by Congress after a decade of experience, and it presents a wide variety of occurrences and possible complications.

Because of a German monopoly on potash fertilizer production, the Congress appropriated funds for a potash resource study in 1911 and 1912. This led to the first potash land withdrawal on January 16, 1913, and to the Potassium Leasing Act of 1917 (40 Stat. 297). Until 1917 potassium had merely been one of the named mineral substances in the several general leasing bills introduced in the Congress. Wartime emergency demands caused its earlier separation from what became the Mineral Leasing Act of 1920.

The main purpose of amending the 1917 act in 1927, the legislative history shows, was to harmonize the earlier act with the Mineral Leasing Act of 1920. The 1917 act had permitted title to pass to one-fourth of a prospecting permit area. This provision did not appear in the 1920 act. One objection to the 1917 act was that the selections isolated remaining lands. It gave title to 160 acres per discovery, against 20 acres for a mining claim discovery. Congress was also unhappy over patenting provisions that did not assure development, and over misuse of the law to gain title for other purposes.

Under the Potassium Leasing Act of 1927 (30 U.S.C. 281-287) the Secretary of the Interior is authorized to grant a prospecting permit giving the exclusive right to prospect for chlorides, sulfates, carbonates, borates, silicates, or nitrates of potassium in federal lands. Upon showing that a valuable deposit has been

discovered and that the land is chiefly valuable therefor, the permittee is entitled to a lease (rather than a patent) for any or all of the land in the permit. The leasing acts relate to mineral deposits. It is immaterial what constituents thereof are the most useful after the deposit has been converted to commercial products (54 I.D. 183, 186).

1927 ACT PROVIDES DISCRETIONARY AUTHORITY

By 1917 the committees of Congress, after three years of hearing on leasing bills, were well aware of the existence of valuable potassium deposits in the form of leucite, a potassium aluminum silicate mineral, in Wyoming and in the form of alunite, a potassium aluminum sulfate mineral found in Utah and elsewhere. In passing the Potassium Leasing Act of 1917 it made specific provision for the leucite. Both minerals were mentioned frequently in the hearings. Congress could have specifically excluded both minerals from coverage by the 1917 act but did not do so. The Department issued its first leucite lease June 4, 1919.

Congress was also well aware in 1917 of the occurrence of potash feldspar in large quantities. During World War I four plants in the United States experimented on extraction of potash from feldspar, and at least 128 patents were issued for extracting potash from silicate rocks, chiefly from feldspar but also from leucite, glauconite, certain sericites and slates, and certain copper tailings. (65th Congress, 3d Sess., S. 5557, hearings before the Senate Committee on Mines and Mining).

In the hearings leading to the Potassium Leasing Act of 1927, potash feldspar as well as leucite, greensand (glauconite) and alunite were discussed as leasable minerals. Again they were not excluded by Congress in the resulting legislation. The 1927 act did not change the applicability of the 1917 or 1920 acts to double salts or complex silicates of potassium.

During the departmental consideration of the proposed legislation, the director of the Geological Survey was at one point asked if the bill would cover the alunite deposits located near Marysvale, Utah, and if so, whether there was any objection to their exclusion from the act. He replied that since alunite is a sulfate of potassium and aluminum, he objected to its exclusion arising from the alumina content. This, he said, would be no more logical than to exclude leucite because of associated values in alumina, the Searles Lake deposits because of associated values in boron or calcium, or the Salduro deposits of Utah because of associated values in magnesium. Since enactment, the 1927 act has been applied to all of these other deposits as well as to the very important deposits of langbeinite, a potassium magnesium sulfate mineral in the mines near Carlsbad, N.M.

The 1927 act grants discretionary authority to provide in potassium leases for the development of sodium, magnesium, aluminum or calcium deposits associated with potassium deposits but separate and distinct therefrom. The frequent occurrence of these deposits in close association made it advisable to provide this discretionary authority where dual development would be difficult or where the added production would make the development of the potash deposit economically feasible (hearings, 68th Congress, 2d Sess., (1925), Potash, H.R. 9029, p. 37).

VEIN POTASSIUM DEPOSITS NOT EXCLUDED

Potash minerals in fissure veins are leasable under both the 1917 and the 1927 acts. The legislative history as well as the terms of the acts indicate no intent to exclude them from leasing. It is beyond dispute that the House and Senate committees knew, in passing the 1917 act, that the Leucite Hills potash deposit of Wyoming is not of the desert basin type and in part at least not of the lode type, and that they knew that alunite occurred in veins at Marysvale, Utah. A proposed exclusion of potassium deposits in veins or lodes was considered but not accepted by the Congress in passing the 1917 act.

In the 1927 act, section 4 provides that "when valuable deposits of minerals now subject to disposition under the general mining laws are found in fissure veins on any of the lands subject to permit or lease under this act, the valuable minerals so found shall continue subject to disposition under the said general mining laws notwithstanding the presence of potash therein." The legislative history of this proviso shows that this means only that, for example, gold found in a separate deposit, could again (after 10 years) be mined in lands containing potassium deposits.

In amending the draft bill in 1927 to continue to allow locations under the mining laws, in particular for precious metals found in separate vein deposits in lands valuable for potash, the Congress apparently thought that the patenting of such 20-acre mining claims would be preferable to patenting 160-acre portions of the 640-acre 1917 potash permit areas, and not arise with such frequency as to adversely affect the development of potassium deposits (66 Cong. Rec. 2031, January 16, 1925). Unless this exception was made, there could have been no opportunity to obtain these locatable mineral deposits in lands containing potassium deposits. Of course the Multiple Mineral Development Act of 1954 has since then established new ground rules allowing the General Mining Law to operate in lands valuable for leasable minerals, with reservation of the latter, thus again opening wide areas to the 1872 mining law.

Much of the foregoing also applies to sodium deposits. Here, too, the Congress was careful to spell out an identical long list of sodium compounds to which the leasing act would apply, thereby specifically including sodium silicates. The applicability was not initially identical, however. The initial Mineral Leasing Act language limited the leasable sodium compounds to those "dissolved in and soluble in water and accumulated by concentration." This restriction was deleted by an amending Act of December 11, 1928 (45 Stat. 1019; 30 U.S.C. 261).

NEW TECHNOLOGY MAY MAKE MINERAL VALUABLE

Changes in technology as well as successful exploration can, of course, change a mineral occurrence of scientific interest only into a mineral deposit by showing that it is valuable. In 1929 W. H. Bradley suggested that the authigenic analcite beds he had found in the Green River formation might have economic value as a source of zeolitic material for water softening. Thirty years later discoveries were made of extensive beds of mordenite, phillipsite, clinoptillite, erionite and other sodium or potassium zeolites in western Tertiary deposits. At about the same time research began to show new, sophisticated uses for synthetic zeolites in catalytic cracking, molecular sieve applications, and selective ion exchange reactions, suggesting that bulk applications in water softening and pollution control are just around the corner for the much less expensive natural zeolites. Lands known to be valuable for these zeolites are now classified as sodium or potash lands.

ARE THERE EXCEPTIONS?

What are the exceptions, if any? One exception that has been suggested is that if a valuable mineral deposit only incidentally contains potassium or sodium and is not primarily used or valuable for its potassium or sodium content, it should be considered to be locatable. The key word here is "incidentally."

The potassium content of potash feldspar is not incidental even today when the potential potassium extraction processes of World War I lie fallow. Feldspar now is primarily used as a flux in glass and ceramics, and is sold on potash content, or its potash/soda content or ratio. It cannot be said that feldspar is valuable only as feldspar for those uses without referring to its potash or soda content.

It is not necessary that the sodium or potassium salt or silicate content be greater than that of any other constituent of the mineral. The percentage may be relatively small. Also, it is immaterial what constituents of the mineral or deposit are the most useful or valuable after processing for sale.

It is thus clear that nearly all valuable mineral deposits containing potassium or sodium as chlorides, sulfates, carbonates, borates, silicates or nitrates are leasable in public lands, whether or not they occur as veins, dikes or beds or as double salts or complex silicates. However, a potassium uranium vanadate (carnotite) or a sodium aluminum fluoride (cryolite) would not be subject as such to leasing.

In view of the foregoing, can there really be any doubt about dawsonite being leasable mineral, both on its own right as a sodium aluminum carbonate mineral or as a mineral intimately associated with organic matter in Colorado oil shale beds? Or can there be any doubt that polyhalite will some day be produced under lease from New Mexico deposits when technology and markets are right? Or that the known deposits of glauberite (sodium-calcium sulfate) or gaylussite (sodium-calcium carbonate) in Nevada and elsewhere will not some day find a market via a leasing operation?

Any doubt, in my opinion, would not lie within the present Mineral Leasing Act. Its provisions and its legislative history seem clearly to cover the types of mineral deposits cited above. The possible doubt depends upon the turn that may be taken by Congress in the future, perhaps as a result of recommendations of the Public Land Law Review Commission.

Mr. BARRY. Mr. Chairman, I suppose we will be leaving right away. Yesterday afternoon I got a call from one of the staff of the committee that something had come up about the percentage of royalty which the Government charges on so-called extractive minerals, and I have secured a memorandum. Unfortunately the way bureaucracy works I wind up with a carbon copy, but at any rate it is a memorandum for the record signed by Mr. Wayland, who, as just mentioned, is the Chief of the Conservation Division of the U.S. Geological Survey. Senator Moss. That may be printed in the record at this point. (The memorandum referred to follows:)

DEPARTMENT OF THE INTERIOR,
GEOLOGICAL SURVEY,
Washington, D.C., September 15, 1967.

Memorandum for the record.
From: Chief, Conservation Division.

Subject: Current Federal royalty provisions in new mining leases.

Coal.—30 USC 207 specifies a royalty of not less than 5 cents/ton. New leases provide for considerably higher royalties, for example:

a. A strip-mined bituminous coal used for steam power is valued at \$3/ton at the mine and brings 17½ cents/ton royalty for the first 10 years and 20 cents/ton for the second 10 years of the lease, or 5.83 and 6.67 percent royalty respectively.

b. A strip-mined lignite used for steam power is valued at \$1.65/ton at the mine and brings 15 cents/ton royalty, or 9.1 percent.

c. A coking coal mined underground under difficult mining conditions is valued at \$8 per ton at the mine and brings 20 cents/ton royalty, or 2.5 percent.

Phosphate.—30 USC 212 specifies a royalty of not less than 5 percent of the gross value of the output of phosphates or phosphate rock and associated related minerals at the mine. New leases typically provide for 5 percent royalty on gross value but not less than 25 cents/ton. For some thick deposits readily strip-mined, the royalty goes to 6 percent in the second 10 years. Other variations in royalty are based on ore grade, mining methods and conditions, and beneficiation. Step scales are used for low grade ores, based on ore analyses.

Potash.—30 USC 283 specifies a royalty of not less than 2 percent of the quantity or gross value of the output of potassium compounds and other related products at the point of shipment to market. New leases typically provide for a royalty of 5 percent of the gross value of refined chloride salts; 2½ percent of the gross value of refined sulfate salts; and 3½ percent of the gross value of unfined potash ore sold and used as manure salts.

Sodium.—30 USC 262 specifies a royalty of not less than 2 percent of the quantity or gross value of the output of sodium compounds or other related products at the point of shipment to market. New leases typically provide for a royalty of 5 percent of the gross value of refined products at the point of shipment.

RUSSELL G. WAYLAND.

Senator Moss. Are there further questions?

Senator ALLOTT. This gives the percentage of royalty on the various minerals?

Mr. BARRY. Yes.

Senator ALLOTT. This is what we were asking.

Mr. BARRY. Of course, we are limited because the only solid mineral—let us say oil and gas are the principal leasing. However, you have potash and coal and so forth, and we charge royalties on them

under the Mineral Leasing Act and the royalty rates are given in this memorandum.

Senator ALLOTT. All right.

Senator MOSS. We do thank you, Senator Douglas and Mr. Barry, for your fine testimony, and we are grateful. We are in recess until 2 o'clock.

(Whereupon, at 12:35 p.m., the committee recessed, to reconvene at 2 p.m. the same day.)

AFTERNOON SESSION

Senator ALLOTT (presiding). The meeting will come to order.

Our next witness is Mr. Morton M. Winston, executive vice president of the Oil Shale Corp., New York, N.Y.

It is my understanding, Mr. Winston, that you would like to have your statement, which is somewhat comprehensive, placed in the record in its entirety, and then if you so desire, to comment on it.

Is this correct?

Mr. WINSTON. Yes. I think, particularly, the detailed comments that we have included in this rather thick, blue binder, I would be happy to have included in the record, if you will, and I will try to summarize rather than to read the statement in full.

Senator ALLOTT. I might say, and I would like to say this to the group as a whole, that we still have six witnesses listed for this afternoon. I do not know what the chairman will wish to do when he comes in, but I do not want to curb the time of any individual in his presentation, even if it means that we would have to have these hearings at a later date. The development of oil shale and the applicability of the regulations is a matter of vital importance, not only to the States of Colorado, Wyoming, and Utah, but also to the United States. And I hope, now that we have had our diversion, that we can get the facts on the subject for which the hearings have been called and stick to them.

You may proceed, Mr. Winston.

STATEMENT OF MORTON M. WINSTON, EXECUTIVE VICE PRESIDENT, THE OIL SHALE CORP., NEW YORK, N.Y.

Mr. WINSTON. Thank you, sir.

For myself and the Oil Shale Corp., we thank the committee for inviting us to express our views. I take it that the main subject of these hearings is designed to be the variety of technical and policy questions raised by the proposed regulations under the Mineral Leasing Act that the Secretary of the Interior promulgated on May 10, 1967. And for the most part, it is to that subject matter that I propose to address my remarks.

However, it is difficult to talk about questions of policy without advertng to some extent to some of the underlying facts, particularly before you, because there is often some lack of agreement of facts which might be thought vital to the determination of this policy.

So, very briefly, I would like to review two factual areas. Senator ALLOTT. Let me make my statement clear, Mr. Winston, in case you did not understand it. It is very vital to a lot of people and it is vital to the people who are attending, and those who have put.

in considerable sums of money to get into the business, so let me say that you may feel free to develop any facts, background, underlying facts, or economic policies, or anything else that you think would back up your testimony with respect to the regulations.

I would say that this applies to anyone else who is in attendance.

Mr. WINSTON. I appreciate that very much. I propose to eliminate a few facts of this statement, and stick to the matter under discussion.

There are two areas that I think are of importance, so far as the need for shale oil is concerned. And the committee has heard here in the day and a half of hearings a good bit that is relevant to this subject, and what we believe to be the status of the industry as it stands today, both as to technology and as to the reserves.

On the question of need, I do not think I have ever heard a more comprehensive, basic analysis than that which Mr. Winger gave to the committee this morning. However, I might say in summary that there are some substantial conclusions to which we think that analysis leads.

We think that domestic shale oil production is not only desirable but necessary, and in the light of the status of domestic petroleum supplies, it has been too long delayed. This was the view of my company in 1957, when it commenced pilot plant operations. The evidence of a deterioration of the domestic crude oil supply position which has accumulated since that is extensive. And nothing that has happened since has changed our views.

In this presentation which has been accepted for the record, we have set out what we think are key statistics, drawing chiefly on the American Petroleum Institute and the American Gas Association surveys.

In summary, they say, as Mr. Winger made plain, that for the past decade the rate of increase in demand for petroleum liquids has been about 3.5 percent a year on the average. It has lately somewhat increased over that, and for the future it is very difficult to suggest any reduction in the rate necessary.

During the same time, the cost of exploration has risen, and the amount of exploration has sharply decreased. This is simply another way of saying what Mr. Winger stated, that the total capital flowing into exploration has not kept pace with the percentage increase in demand.

As the result of these facts, which we think are not new—they have been quite apparent for quite a few years—it had become apparent that by 1957 net additions of approved liquid reserves had just about ceased to exist. None has occurred since, except in 1959, and with the exception of that year, which showed about a 3-percent net increase, none has occurred.

Everybody has a favorite year toward which to project domestic supply and demand. We have chosen 1980. And we used the statistics that were used by Mr. Winger. By that time we would anticipate about 6 billion barrels of consumption per year, which is the equivalent of about 17 million daily barrels, as against our present 12 million barrels.

Even if from now until then, by conventional means, we could increase exploration at the rate of increased demand, the reserves in the ground in 1980 would represent substantially less than 7 years' supply. And, again, as Mr. Winger and others have pointed out to this committee, there is no indication whatever that the exploration rate is

likely to be increased, even with an increase of flow of capital or, in fact, that we can avoid the deterioration in the finding rate.

In summary, it is apparent that if we rely, as we now do, upon conventional domestic sources to satisfy about 80 percent of our liquid petroleum demand through 1980, we will by that time be deficient in liquid petroleum by any standard we have until now used to test petroleum supplies.

Approximately 20 percent of our demand depends upon net increase, and if we have that reliance it will be plainly in addition to any production or projected domestic rate that has been made, but in our view it affects only, if you will, the degree of emergency and not the question of whether it is timely that we, as a nation and an industry, must supplement our sources for liquid petroleum supplies domestically.

This is also, I think, the conclusion of Dr. Jones, whose dates must be slightly different than ours, when he said there is not enough time required for substantial production and the difference of 2 or 3 years in a projection of urgent need is not very realistic.

And we do not think that the obvious alternative way of supplying that need from foreign sources by the end of the next decade is very plausible. It is unlikely, as Dr. Jones said, that increased exploration from conventional sources and supplies, the diversion of petroleum demands, and the use of other sources, as Mr. Winger said would be of help, will supply the bulk of the petroleum demand as created by what he called the transportation industry, simply automobiles. And there is not, in the near-term future, any way of approaching that question of petroleum supply for the existing vehicles and supplying the demand in that field within the time that we are talking about, which is still roughly, 1980. This leaves one possibility and one only, and that is a very materially increased reliance upon foreign sources of supply which is, certainly, feasible, but as the committee has remarked, and other witnesses have, the sad events in the Middle East in recent months have made more dramatically evident than has, perhaps, been true for some time, the difficulty of relying upon foreign supplies, not only as to their potential costs but ultimately, at some time, as to their actual availability.

We do not think, however, against this background of immediate and projected needs that shale oil is going to be the entire answer. In fact, we do not think that it is going to be more than a significant part of the total answer. The reason is that, in our view, the conceivable maximum rate of production from the very large reserves of the tri-State area would be impossible to achieve within the 10-year period that we are talking about. It is also evident that the tri-State area contains some alleged 2 trillion barrels of oil.

We think that statement may well be correct, but for planning purposes, petroleum supply purposes, it is, unhappily, irrelevant. The reserves are principally, today, mainly in western Colorado and to a small extent in eastern Utah. The Oil Shale Corp. has estimated, and this committee has heard other and different estimates, that there are approximately 480 billion barrels of oil of economic or attractive grades in the Colorado reserve alone.

I would like to stop there for 1 second to say that the reserves in a place obviously do not mean that you can attempt to analyze how much

of those reserves are of an attractive grade which may ultimately be brought to the surface of the ground. I do not know, but I suspect that, in arriving at the estimates that are available today, it results largely from the view as to the utilizability with present or foreseeable technology. My company has looked into this in a preliminary engineering way without field work, and studied the feasibility of deep shaft mining of the reserves or what are usually meant by reserves. And our estimates about it are based on the conclusions that we reached from that necessarily preliminary study.

We do have those reserve figures which are in excess of our access and recovery by conventional mining methods, and therefore tend to include them in estimates of economically interesting number of barrels in the ground. It is certainly an ample basis for others to disagree or to apply lower potentials.

There are an estimated 480 billion barrels of reserves, which is a number we think is sound. That is an extremely large number. The number will remain extremely large, even if it were reduced to 150 billion barrels, or increased to 750 billion barrels.

My principal concern about the reserves is the probable rate of production from them. As I have said, much of these reserves are deep. They also exist, even when not deep, under very difficult conditions of access, often restricted geographical areas, and the question of the disposal of waste, difficult operating problems at various altitudes, all combine to make us conclude that it is most unlikely, at any time that we can foresee, that more than 2.5 million daily barrels of production simultaneously could be expected from the entire mass reserves of the basin.

We do think that 50,000 barrels could come onstream in 1970, and 100,000 barrels a day every year thereafter until 1980. That is a lot, when the capital investments or estimates are in the neighborhood of \$130 million as the initial cost for approximately 50,000 daily barrels. Even at that rate, shale oil in 1980 would be supplying less than 6 percent of the estimated 17 million daily barrels of demand of petroleum liquid, and less than 20 percent of the increase in demand for petroleum liquids between now and 1980.

These facts, we think, make it plain that two comments often voiced in recent months are without any substantial foundation. First, there is no basis for the statement that shale oil may at any time inundate markets and, secondly the suggestion that the value of the reserves could retire the national debt, and pay a substantial cash bonus to all of us who are citizens and would be delighted to receive it, is without foundation.

At the rate of production that we can foresee, and the reserves that we can analyze as utilizable, and any conceivable evaluation of the final crude oil product, and any royalty rate that has been mentioned yet in hearings here, the revenues from maximum production would not suffice to even pay the interest on the national debt.

We began with the question, whether the commencement of shale oil production is desirable. We think it is, beyond any question; that it is not merely one of degree or of timing by a couple of years, but that it indicates unequivocally that new liquid sources are necessary and that, therefore, shale oil is a likely and needed substance.

That takes me to the other set of facts that I would like to mention to you, the status of the oil shale industry as we see it today.

First, as to the state of the technology. The technology needed for commercial shale oil production is not merely the retorting technology required to heat the oil shale, to produce condensible and noncondensable vapors yielding liquid and gaseous petroleum. It is true, of course, that a retort must be employed to produce the necessary vapors, which are then converted into the petroleum product.

However, before that material can be retorted, it must be obtained by a mining operation, and a mining operation on an unprecedentedly large scale. And when the product is obtained it must be treated, or properly crushed to appropriate size. Having been crushed, it is retorted and the valuable products of retorting are collected, but the remaining material, as much as 90 weight percent of the original feed, must then be disposed of consistently with contemporary high standards of the purity of air and streams.

The oil should have nitrogen and sulphur in substantial quantities removed from it to make it suitable for ordinary refinery work. And waste disposal and treatment of the oil are component operations in the costs for shale oil production.

In 1964, we joined with an experienced mining company and an oil company to establish definitively the operability and economics of a TOSCO developed system for shale oil production. The results of that work are now substantially all in hand.

The feasibility and costs of mining the material have been established to a high level of certainty, and while within original projections, notwithstanding adjustments in the national economy in the intervening years, a development mine has been and is being operated, and more than 500,000 tons have been mined to date.

In June 1965, the three companies completed construction of a semi-works retorting facility designed to operate at 100,000 tons per days of rock throughput. The plant represented a design scale-up from pilot plant operations carried out by TOSCO from 1957 onward of 24 tons per day. The semiworks retorting operation, originally scheduled for completion early in 1966, encountered difficulties associated both with the problems of joint management and of the initial operability of the facility.

As a result, in September 1966, TOSCO assumed sole operating responsibility for the plant. Since that time, albeit well over a year behind schedule, the objectives of the retorting and shale disposal operations have been met. The process, called the TOSCO II system, operates continuously and yields about 105 volume percent of the so-called modified Fischer Assay, and continuing operations indicate further improvements.

The oil is produced substantially free of solid sediments and well within original specifications. The plant is mechanically reliable and simple to operate. Spent shale disposal operations have been achieved consistent with high standards of air and stream pollution control and the preservation of wilderness and wildlife. The current operating program, which is devoted to further process organization, is nearing completion.

I would like to supplement the remarks on regrowth that were made yesterday. We have been in the business of producing spent shale a lot

longer than the Union Oil Co. has and, therefore, I cannot assure you of their results, but we are carrying on intensely the localized regrowth studies of all of the naturally occurring flora in the area and have found, as the Union Oil Co. has found, that regrowth presents no substantial cost factor.

We have the deepest admiration and regard for Senator Douglas, who had occasion to mention this morning that he had intended to visit our plant. He acknowledged our legal rights. This is a subject matter that I was not going to raise if it were not on the record of this committee. Senator Douglas' visit was confined to our gate, after he did, in fact, appear there, accompanied by others whose identity I do not know. Our guide in uniform is under instructions which will not be varied, I think, even for someone he recognizes as the President of the United States. And upon request for a visit, he must clear that request unless the name appears on the list that he has in his possession. It must be cleared with the executive headquarters in New York.

I am sure that when the Senator appeared he was so informed and was offered the courtesy of the use of the guardhouse telephone to call the executive offices in New York in order to make an appropriate request for a visit to the plant. He declined to make that call, which I greatly regret, but I thought it necessary that we make it plain on the record what we understand those events to have been.

I think that the committee does know that a number of the committee staff have visited the facility, as does the Department of Interior know that several representatives of the appropriate office of the Department have also visited the facility.

Based upon these operations, and utilizing only the equipment of a type proved in these semiworks scale operations, TOSCO, in the fall of 1966, commissioned a distinguished and experienced contracting company to design the commercial plant, including final plans and specifications for its construction. The contractor's resulting "definitive estimate" is now complete. The plant will process 66,000 tons per day of rock through-put. The cost of the plant, including all expenses associated with achieving full operation, is under \$130 million, including hydro-treating and byproduct recovery facilities.

Without hydro-treating and related facilities, the same plant, to produce the raw shale oil through bulk or pipelining, will cost under \$100 million.

These costs are slightly above those originally projected, principally on account of cost increases in equipment and related costs since 1964. However, the increases are offset by increased capacity over that originally estimated, as well as by substantially increased product and byproduct recoveries and values. In short, the criteria established for the project in 1963 have now been met.

TOSCO's program calls for the first 58,000 daily barrels of production to be onstream in 1970, and we believe that this objective is reasonable and obtainable.

One word about the 58,000 daily barrels. There is a perpetual confusion between barrels every day and calendar day barrels, and barrels produced during every day's operation of a plant, which is called "stream day barrels" and relates to the operating efficiency of the plant. The operating efficiency of this plant would be approximately

90 percent. And 58,000 daily barrels, measured by stream day barrels on a calendar day basis, would correct the number by 2,000 barrels per day.

The funds already expended by TOSCO and its associates in furtherance of this commercial production venture provide some indication of its magnitude. TOSCO has, itself, expended more than \$21.5 million. In addition, approximately \$26 million has been spent by its associates. Of the total of approximately \$47.5 million, approximately \$23.5 million has been devoted to acquisition of reserves, principally to those susceptible of immediate commercial development and capable of producing more than 200,000 daily barrels for over 25 years. The remaining funds have been expended to carry the technology to its present state of readiness.

The mining, retorting, and related technologies which have thus been proved and will be commercially applied are, by agreement, under the sole control of TOSCO as exclusive licensor. As licensor, TOSCO has embarked upon a free and open licensing policy under which it will make all or any part of the technology available to bona fide licensees under terms reasonable and customary in the trade.

Such a free and open licensing policy is consistent with the widespread practice of the petroleum industry, a practice which experience has shown stimulates competition, production, and revenues.

Nor is TOSCO alone in the field of technology. The committee has had the benefit today of the views of the Union Oil Co. of California and is surely aware of Union's sizable contribution. In addition, there is the work of the Bureau of Mines through its various research facilities, and more recently, of the group of companies associated together under the management of Mobil Oil Co. at the former Bureau of Mines facility at Anvil Points in Rifle, Colo. Some, and perhaps all, of these efforts in above-ground processing technology will undoubtedly prove not only successful but sufficiently attractive to permit industrial application.

The development of technology for processing the material "in place" today, as they have mentioned, has become unclear due to reports of the presence of other minerals as well as because of formidable technical problems. However, as a nation, we have learned to expect that we will develop technology to meet our needs. Suitable methods for *in situ* processing in at least some of the deposits will likely ultimately be developed.

As Senator Allott said yesterday, there are places that have been found in the basin where, in fact, when 1,400 continuous feet of high quality material has been recorded, the depth at the bottom of the shaft is 2,200 feet below the surface.

Since by far the more overwhelming percentage of the oil is found in these deep places, and they lie at the center of the basin, and by far the overwhelming percentage of the contained oil lies in the public domain, which is also found principally at the center of the basin, TOSCO estimates that approximately 65 percent of the acreage containing approximately 84 percent of the oil in place is in the public domain and the Naval Reserve properties.

Against this background of fact, I would like to turn to the question with which the committee is primarily concerned, the matter of the

leasing policy. We have already submitted to the Department of the Interior, in response to its invitation, rather detailed comments upon the proposed regulations. And these have been included in this volume. I have no intention of boring you with every last detail of what is essentially a legal analysis of the proposed draft. I would like to devote the time available today to consideration, not of details, but of some of the broader questions of policy which we feel arise out of the program embodied in the proposed regulations.

I shall discuss two matters. The first concerns the needs, which we think is amply established by the facts, for the prompt commencement of an additional program of leasing for commercial production. Such a program is not embodied in the proposed regulations.

The second concerns the research and development leasing, which is embodied in the proposed regulations. Despite the large efforts and constructive intentions of the Department, the program, in our view, fails to meet its stated objective of stimulating production research and industrial development.

Turning first to leasing for commercial production, the proposed regulations embody the view, which we share, that it is appropriate to encourage future production research and development by making available public domain reserves for research and, thereafter, for production. We are unable to reconcile that view, however, with the absence of a provision for production leases, which would permit the application of existing technology developed by industry without government participation or incentives.

If new techniques should be commercially applied, if and when they are successfully developed on public domain reserves, why should the successful fruits of extensive past labors be ignored or discriminated against?

The question is not merely whether those who have successfully developed technology should be offered the same opportunity of utilization of public reserves as those who now undertake research, although that is to us an important matter. The broader concern is that the modest increases in domestic supplies which shale oil can provide are necessary, and the public domain reserves should be available to those who are actually prepared to go forward to production with existing technology in order to meet that need.

There are, to be sure, problems of mechanics; but with due regard to the opposing of some distinguished commentators outside the industry, it should be stated clearly that there are no mechanical problems which will not yield to past leasing practice and ingenuity. A combination of modest, fixed royalty rates and competitive bidding can assure fair recognition of the value of the public ownership of reserves.

Production requirements, which escalate sharply with time, can assure that no lessee can acquire a leasehold except for purposes of production.

The Legislature of Colorado has recently enacted, as I am sure Senator Allott is aware, broad new pollution regulations. Quite apart from constructive contributions by the Department, it may be anticipated that those regulations will be enforced and refined to meet Colorado's needs in regulating the developing oil shale industry.

Moreover, negotiations or discussions between the Department and industry, in light of existing technology, would provide substantial guidelines for requirements designed to serve any additional Federal interests in conservation and pollution control.

These and other mechanical questions can be thoroughly and effectively resolved if once the decision is made that we think the facts call for, namely, that a program for commercial production oil shale leases is now timely.

The proposed research leasing regulations create different objectives. The stated objective of the proposed regulations is to encourage production research and development. In proposing the regulations, the Department has taken the first constructive step in this field in the 37 years which have elapsed since the oil shale lands were withdrawn by President Hoover's Executive order. For having taken this first step, the Department and the Secretary deserve the approval and support of all who, like this committee, have an interest in planning and providing for the Nation's petroleum needs.

Nevertheless, we believe that the proposed regulations do not, in fact, meet their stated objective and will not encourage utilization of the public domain reserves or stimulate research and development. There are many reasons why that conclusion must be reached, and we have stated them in detail in our attached comments.

Among the most important are the indefiniteness of the assurance offered to a research lessee that, if it is prepared for production, it will, in fact, receive a commercial production lease; the indefiniteness of the extent of the commercial leasehold, if it actually granted; the inappropriately high, fixed, and escalating royalty rates, which the Secretary here stated, which are reported to have been designed to be equivalent to rates applicable to established conventional production; and the extraordinary requirement of surrender without compensation of the fruits of all new research, as well as surrender of control over technology previously developed by the lessee.

On the question of royalties, we are quite ready to approve the proposed escalating royalty rate as reasonably equivalent in the light of the capital investment in effect in other fuels. The difficulty is that it is that fact which proves that they are inappropriate. We are talking about an experimental program, under this set of regulations, in which companies are expected to spend up to 10 years of substantial research funds and, thereafter, at least as the regulations are now drafted, they are expected to apply under a commercial lease only that technology which they developed, since the regulations make no provision for utilizing technology in the meantime developed by someone else on the proposed commercial leasing.

Under those circumstances, it seems to us inappropriate that the resulting royalty rate should be tailored to be equivalent to royalties that would be paid in an established industry utilizing established techniques to produce conventional reserves.

There are three objectives which seem to be encompassed in the regulations. First, the lessee is asked to pay the royalty rate which is said to be equivalent to commercial royalty rates in that field.

Second, the lessee must also pay by giving up his technology. I think that in the Secretary's statement he referred to purchasing