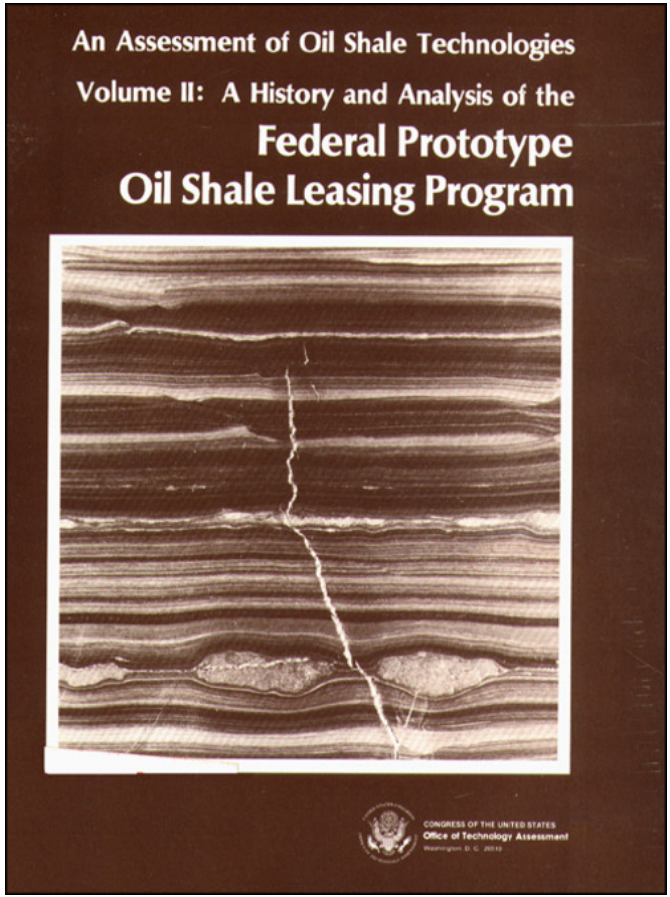
Assessment of Oil Shale Technologies—Vol. II: A History and Analysis of the Federal Prototype Oil Shale Leasing Program

July 1980





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Foreword

This volume discusses the Federal Prototype Oil Shale Leasing Program that began in 1974 when the U.S. Department of the Interior sold leases to four tracts in the oil shale regions of Colorado and Utah, A prior leasing attempt in 1968 is also described because it provides an historical perspective about the imperatives that have encouraged the development of Federal oil shale lands by private industry and the restraints that have inhibited such development.

The report includes discussions of political, economic, environmental, and energy-related factors that affected both the 1968 leasing attempt and its successor—the current Prototype Program. The Program's goals are identified, and its progress and status are examined to determine if those goals have been met or are likely to be met in the foreseeable future.

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List of Acronyms

BLM —Bureau of Land Management
DDP —detailed development plan
DOE —Department of Energy
DOI —Department of the Interior
EIS — environmental impact statement
EPA —Environmental Protection Agency
ERDA —Energy Research and Development Administration
FLPMA —Federal Land Policy and Management Act
MIS — modified in situ
NAAQS —National Ambient Air Quality Standards
NEPA —National Environmental Policy Act
PSD —prevention of significant deterioration
Tosco —The Oil Shale Corporation [now Tosco, Corp.)
USBM —U.S. Bureau of Mines

CHAPTER 1

Introduction and Background

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Introduction and Background

The oil shale deposits of the Green River formation occur in several geologic basins in Colorado, Utah, and Wyoming and underlie some 17,000 mi^2 (11 million acres) of terrain. Nearly 72 percent of the land, overlying about 80 percent of the oil shale resource, is in the public domain and is controlled by the U.S. Department of the Interior (DOI). Most of the Federal land is located near the depositional centers of the basins and contains the thickest and richest oil shale deposits. The remaining lands are controlled by individuals, private companies, and the governments of the three States.

Oil shale lands were acquired by the States under the provisions of their respective statehood enabling acts. Private holdings were acquired during the late 19th and early 20th centuries by individual homesteaders, by the railroads during construction of the transcontinental rail line, or through patenting of placer mining claims for oil shale and other minerals, The railroad lands comprise odd-numbered sections of each township within 20 miles on either side of the railroad right-of-way through the Wyoming oil shale basins. The total acreage of these holdings is very large, but commercial development is inhibited by the small size of individual tracts, by their distribution in a checkerboard pattern, and by the relatively poor quality of the oil shale resource, It is possible that the railroad properties could be developed in conjunction with leasing contiguous State or Federal sections. At present, however, the best opportunities for development on private lands appear to lie with the holdings that have descended from homesteads and mining claims.

The Mining Law of 1872 and the Petroleum Placer Act of 1897 did not specifically mention oil shale, and it was not until 1920 that shale was finally determined to be subject to the placer provisions of the two laws. Prior to 1920, however, they were interpreted to allow oil shale to be characterized as a locatable mineral which permitted prospectors to acquire Federal oil shale lands by staking and filing placer mining claims, performing a few hundred dollars worth of work on the claim site, and paying small fees to purchase "patents" that conveyed ownership of both surface and mineral rights. Physical discovery of the deposits was required. This requirement, coupled with that for assessment work, resulted in the location of claims along eroded water courses where the deposits are visible and easily accessible.

Numerous placer claims were filed during the petroleum shortages of 1915-20, and patents for many of these were obtained by the prospectors or their successors. Today, these patented claims, together with the earlier homesteads, comprise the privately owned oil shale lands in Colorado and Utah. Individual claims and homesteads were originally quite small because of size restrictions imposed by both homesteading and mining laws. However, many of these small tracts were subsequently purchased by large firms and were unified into much larger development blocks.

Today, private interests (including the railroad) have clear title to 21 percent of the oil shale lands in Colorado's Piceance basin, 9 percent of Utah's Uinta basin, 24 percent of the Green River basin in Wyoming, and 10 percent of Wyoming's Washakie basin. In general, the private holdings are located near the peripheries of the basins and contain thinner deposits of lower grade oil shale than do the Federal lands near the basin centers. Some private tracts do contain high-quality shale, and some are large enough to sustain a major facility. For example, Union Oil Co. 's 29,000 acres in Colorado are distributed over three noncontiguous tracts, at least two of which should contain sufficient oil shale for long-term development. In contrast, the holdings of some other firms, although similar in total acreage to Union's, are subdivided into numerous small tracts that are scattered across the basins. For example, EXXON Corp. owns over 10,000 acres in the Piceance

basin, but this land is distributed over about 30 noncontiguous tracts. It is questionable that any single tract would be large enough for commercial development.

Despite disadvantages with respect to tract size and resource quality, it should be possible for a substantial industry to be initiated on private holdings. Some companies have taken preliminary steps along this path when economic conditions have appeared especially favorable. But, private landowners (generally major energy companies) have traditionally declined to commit to large-scale development pending a clarification of the Government's position with regard to private access to public oil shale resources. If industry did invest in private tracts the Government could subsequently permit development on adjacent Federal lands that, according to industry, had greater profit potential.

As noted above, the private sector was first allowed access to public oil shale lands over a century ago, by passage of the 1872 Mining Law. The 1920 Mineral Lands Leasing Act ended the process of claiming Federal oil shale lands and imposed a leasing process to promote private mining of oil shale and specific other minerals. The Act empowered the Secretary of the Interior to lease to any qualified person or corporation "any deposit of oil shale . . . belonging to the United States and the surface of so much of the public lands containing such deposits, or land adjacent thereto, as maybe required for the extraction and reduction of the leased minerals . . ." The Secretary was required to assess annual rentals of 50 cents per leased acre, and the maximum size of an individual tract was limited to 5,120 acres (8 mi2). No individual or firm could hold more than this acreage under lease in the United States. Except for these provisions, the Secretary was given broad discretionary powers to select lease tracts and to shape the terms of development leases. Five oil shale lease applications were filed with DOI after 1920. Three leases were issued, but all were subsequently canceled.

In the early 1920's, during the Harding administration, Secretary of the Interior Fall was alleged to have accepted bribes from an oil company in consideration of noncompetitive leasing of Naval Petroleum Reserve No. 3—the Teapot Dome field in Wyoming. In 1930, during the era of caution that followed the Teapot Dome scandals, President Hoover issued Executive Order 5327, which withdrew oil shale lands from leasing under the Mineral Leasing Act and "temporarily" reserved them for the purpose of "investigation, examination, and classification. " Since 1930, the temporary order has been modified on a few occasions. In 1933, for example, Hoover's Executive Order 6016 permitted oil and gas leases on the oil shale lands, and in 1935, President Roosevelt's Executive Order 7038 authorized prospecting permits and development leases for sodium-bearing minerals. The order has also been modified from time to time to permit reserve exploration and disposition of specific surface rights in limited areas. With these exceptions, Hoover's order remained in effect and essentially unaltered for over 40 years. No oil shale leases were issued during this period.

In 1952, President Truman issued Executive Order 10355, which authorized the Secretary of the Interior to rescind the withdrawal order. Subsequent Secretaries, however, have been reluctant to exert the authority for fear of creating the environment for a leasing scandal like Teapot Dome. In 1965, testifying before the Senate Committee on Interior and Insular Affairs, Undersecretary of the Interior John Carver, Jr., described the situation as follows:

> 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 , . . No Secretary . . . 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 . , . This reserve is so big and so valuable that , . , it tends to freeze any kind of action, either congressional or administrative,

Interior's hesitation was compounded by the uncertain status of unpatented mining claims

on much of the Federal land and by a prevailing feeling that shale oil was not needed by the Nation,

From time to time, administrative inaction proved unacceptable to congressional delegates from Colorado, Utah, and Wyoming. These legislators, with urging from State officials and the energy industry, pressed DOI to lease the Federal oil shale lands with the rationale that development was in the Nation's interest, would provide indigenous energy supplies, and would convey economic benefits to the State and Federal Governments.

In the 1960's and early 1970's, such pressure contributed to the formulation of two different but related leasing attempts. The first was promulgated as part of a comprehensive oil shale program in the Johnson administration by Secretary of the Interior Stewart Udall between 1964 and 1968. Udall's lease offerings failed to attract private participation, Other portions of his program were carried forward into the Nixon administration, however, where they were supplemented by the Federal Prototype Oil Shale Leasing Program under the direction of Secretaries Hickel and Morton. The Prototype Program was successful in that private capital was committed to four lease tracts in Colorado and Utah. The Program is continuing today, although in substantially modified form.

An understanding of the evolution of the 1968 attempt, and of the past, present, and possible future of the Prototype Program, is important to the formulation of effective Federal oil shale policies. This volume provides a history of both programs. Its purpose is to convey background information for answering the following questions:

. What political, economic, and energy supply situations prevailed when the programs were initiated and how did these situations affect industry's response to the lease offerings?
- How did the terms of the lease offerings affect their relative successes?
- What forces and factors affected the course of the Prototype Program?
- How has the Program succeeded or failed in meeting its objectives?
- What are its possible futures?

Discussion begins with historical accounts of the two leasing programs, including analyses of the forces at play during their evolutionary phases. The programs are then contrasted in an attempt to explain why the Prototype offering attracted private capital while its predecessor did not. Finally, the objectives of the Prototype Program are reiterated, and the Program's status is analyzed to determine whether its objectives have been achieved or are likely to be achieved, given the current energy situation and economic climate.

The Prototype Program has been affected by all of the key issues that currently cloud the future of the U.S. oil shale industry. Included are legal issues associated with landownership, environmental issues surrounding the potential effects of development on the area's ecosystem, uncertainties associated with the development and promulgation of regulations under the National Environmental Policy Act and other legislation, economic issues regarding the cost of producing shale oil for use in an uncertain energy future, and technological issues associated with emerging processes. These larger issues are discussed at length in volume I because their effects will be felt in all future approaches to development, regardless of whether they are conducted within the aegis of an expanded Prototype Program or as parallel efforts external to the Program. Issue analysis is intentionally brief within this volume, and issues are discussed only as required to clarify their effects on the character and progress of the Program.

CHAPTER 2

An Initial Attempt at Oil Shale Leasing (1963-68)

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An Initial Attempt at Oil Shale Leasing (1963-68)

Introduction

In 1963, Secretary of the Interior Udall was strongly encouraged by Western-State political interests to create a Federal oil shale policy, In response to this pressure, the Department of the Interior (DOI) organized an advisory board of private citizens to analyze the constraints on oil shale commercialization and to recommend procedures for initiating and managing development of public oil shale resources. In 1967, DOI incorporated some of the board's suggestions in a tentative leasing proposal that was withdrawn after public review, DOI" S approach to leasing was substantially revised after additional study, and in 1968, DOI offered three Colorado lease tracts to private industry. No acceptable bids were received, and the leasing program was terminated.

Although it failed, the 1968 lease offering triggered a series of actions that led to the current Federal Prototype Oil Shale Leasing Program. Many of the attitudes, imperatives, and impediments that shaped the 1968 attempt also influenced the evolution of the Prototype Program and its implementation in 1973 and 1974. This chapter describes the evolution of the 1968 program and discusses the reasons for its failure.

The Political Environment

As noted in chapter 1, the Secretary of the Interior was given authority in 1952 to lease Federal oil shale lands in the Western States, but DOI pursued a course of inaction for fear of scandals and because no urgent need was felt for new fuel sources such as oil shale. In the 1960"s, congressional delegates from Colorado, Utah, and Wyoming responded to DOI's inaction by urging Secretary Udall to formulate a development policy for Western oil shale. Particularly active were Colorado Representative Aspinall, Chairman of the House Committee on Interior and Insular Affairs, and Senators Allott of Colorado, Hansen of Wyoming, and Moss of Utah on the corresponding Senate committee. These proponents of oil shale development were supported in principle by Senator Bennett of Utah, Senator Dominick of Colorado, and Representative I Harrison of Wyoming. Congressional advocates were aided by the Governors of Colorado, Utah, and Wyoming who differed in their specific motivations and objectives, but were unified in their efforts to enhance the economies of their respective States.

The proponents of private development of public oil shale lands expressed their desires to enhance economic stability and to counter the threat to national security posed by the Nation's diminishing petroleum reserves and growing reliance on imported oil. Working against their efforts were legislators such as Illinois Senator Douglas, Senator Proxmire of Wisconsin, and Senator Hart of Michigan. These men emphasized the need for protecting the public's mineral-resource heritage and avoiding an oil shale monopoly by the major oil companies. Pressure from both advocacy positions affected all phases of Secretary Udall's attempts to develop an effective oil shale policy.

At the same time, several articles appeared in the public press that were unequivocally concerned with the hazards of encouraging private control of the public lands. An example is the work of Mr. J. R, Freeman,

editor of the Farmer and Miner newspaper of Frederick, Colo., and a long-time critic of private oil shale developers. Beginning in 1965, Mr. Freeman published a series of 38 articles entitled "The Multi-Billion Dollar Grab of Oil Shale Lands, " which alleged fraudulent efforts on the part of private individuals, corporations, and Government officials to dispose of the public oil shale lands.

Mr. Freeman's style was provocative, and many of his allegations were controversial. However, his views reflected those of numerous citizens who were dissatisfied with the Government's management of public resources. He was perhaps the most vocal opponent of Udall's leasing efforts, and he periodically referred to the Teapot Dome scandals to characterize his concern about the DOI program. At Senate hearings in 1967, he presented a written statement that included the following claims and allegations:[1]

> Let me make one point crystal clear, I am for development of the West's oil shale resources. I want progress, but I want real honest-to-goodness development of the public lands for the public benefit. I do not want: (1) Enrichment of speculators who use phony oil shale mining claims filed 47 years ago to buy public land containing 3,000,000 barrels of shale oil per acre for $2.50 per acre and then sell them to the oil companies for $2,000 per acre. (2) Transfer of the public domain to the control of a few monopolists who lock up the oil shale so it won't compete with their Arabian and Texas oil. (3) Disposal of the public oil shale lands or leasing of large blocks of oil shale lands before the recovery processes are developed and the real values are made known to the public, (4) Robbery of the public through fraudulent, conniving, collusive or self-serving actions by public officials who are in cahoots with speculators and oil companies. Indeed, Gentlemen of the Senate, present Department policies are leading directly to these undesirable and deplorable consequences . . . I must report to this distinguished body that I have found key officials and employees involved in handling oil shale in the Executive Branch, especially in the Departments of the Interior and Justice, and in the Legislative Branch, sadly lacking in honesty, and openness.

Another analysis was offered by Mr. Chris Welles in Harper's Magazine. Welles, an associate editor for Life magazine, appraised the oil shale situation and pointed out that DOI's leasing efforts had been, and would continue to be, influenced by strong political forces, both favoring and opposing private development of the public's resources. He pointed out that little credence was given in Congress to claims of scandals. However, he expressed concern that the oil industry was moving into a position of control and described congressional attempts to counter these moves as follows:[2]

> While the oil industry's attempts to dominate shale research are well-documented, it is impossible to verify the recurrent allegations about a Teapot Dome-size scandal—a giant giveaway mounting into the billions of dollars. What does emerge clearly is the fact that the government under dubious circumstances allowed oil companies and land speculators to gain ownership of many thousands of acres of rich shale land, and readily acquiesced to the oil industry's concept of a prudent Federal shale policy ., . Senator Philip Hart of Michigan sees shale oil development as a means of reducing the monopolistic power of the oil industry (which has lately been expanding into many other energy industries, including coal and nuclear power). Senators Robert Kennedy and William Proxmire—among others—sponsored legislation designed in part to accomplish this,

Similar concerns and analyses were provided by Julius Duscha in an article in the Atlantic Monthly. Mr. Duscha, a member of the national news staff of the Washington Post, described the congressional climate as follows:[3]

> . . . the controversy over the shale oil lands involves a cast of strong characters in positions of power and influence ., . The most influential proponent of immediate leasing is Congressman Aspinall . . . representative of the congressional district containing the richest of the shale deposits . . . "Natural resources were placed there to be used, ' Aspinall maintains, "not to be cooped up for future generations ., . The oil isn't worth a

hoot to anybody as long as it is in the ground. ”

Mr. Duscha provided the following recommendations for a national oil shale policy:

> . . . if the public interest is to be served, Udall—and President Johnson—must first make certain that no legislation is pushed through Congress forcing the government to lease its shale lands before their true value is known and before the cost of taking the oil out of the rock is determined . , . The government does not, however, necessarily have to develop the shale lands itself, What is necessary is that the government protect the public interest in this great resource, once private development of these Federal resources is permitted , , , Large tracts of land are not needed for experimental work, and if it is necessary, the government can lease small sections of its shale lands to facilitate research.

Colorado Senator Dominick responded by contrasting Duscha’s premises and conclusions with those of Mr. C. E. Reistle, chairman of the board of Humble Oil and Refining Company. Mr. Dominick made the following comments on the floor of the Senate in 1966:4

> . . . I do not agree with (Mr. Duscha) on his analysis of the problem or his approach in the article , . . The article (by Mr. Reistle) shows quite clearly, in my opinion, the need for new energy resources in our country, resources which are not subject to being shut off in the event of national emergency , , . This shows the absolute futility of taking a natural resource of this size and leaving it in the ground where no one can get at it. We have been urging the Secretary of the Interior to establish rules and regulations for the leasing of those properties, I think it is important that that be done instead of putting it on the shelf as has been done, awaiting further action and apparently waiting further development of research programs now going on.

Senator Allott of Colorado was also discontented with DOI’S hesitation and with what appeared to him to be a preoccupation with avoiding scandal. Mr. Allott made the following comments during a dialogue with Secretary Udall at the Senate oil shale hearings in 1967:[5]

> . . . I am afraid that in a sense we are all affected with the Teapot Dome Syndrome. I am sure that neither the Secretary nor any of his assistants nor his administration are going to be involved in anything which would effect a situation which would result in a monopoly or a windfall to any company if it can possibly be avoided . . . So I hope that this syndrome, which seems to pervade much of your discussion and thinking, can be discarded with the concept that no one (is) looking for such a windfall.

Senator Allott was also concerned about the effects of delays at the Federal level on the long-range economic viability and commercial attractiveness of the oil shale industry. He made the following statement regarding the problems of establishing an industry in competition with conventional petroleum and alternate synthetic fuels:[h]

> there would seem to be plenty of room for everyone sincerely interested in developing an oil shale industry both in terms of shale land and in terms of market opportunity. However, in the final analysis the need for and the emergence of an oil shale industry will be determined on a basis of economics, Oil shale will have to compete with other energy sources and fuels . . . It would be most unfortunate if oil shale’s inability to compete was as a result of either government action or government inaction, because it would deny us the many benefits that could result from such an industry . . . I am very strongly of the opinion that we are at the point where, unless we can provide sufficient incentives to private industry, those people who would normally be interested in development of an oil shale process will turn to coal because of blocks put in their way, and . . . our oil shale industry . , . might even be wrapped up forever and completely bypassed in favor of other energy resources. I am sure that the Secretary does not want to see this happen any more than I do.

The opinions expressed by oil shale proponents in Congress were echoed by the Gover-

nors of Colorado, Utah, and Wyoming, who provided statements for the record of the Senate hearings that were convened in February of 1967 to consider a preliminary draft of Udall's initial leasing proposal. Colorado's Governor Love provided the following expression of support:'

> The earliest possible development of our oil shale resource is essential to assuring a solid long-range supplement to our domestic petroleum supply , . . The problems which now obstruct the development of our oil shale deposits are many and complex, but they are not insoluble. It is apparent, however, that a prompt and vigorous start must be made to achieve even such a long range goal as a respectable capacity to produce oil from oil shale not later than 1975. To decide to wait until all of the problems have been identified, studied, and solved would, because of the constantly changing effect of other economic factors, be tantamount to a decision *not* to foster the development of oil shale and in fact to discourage it. While we do not counsel hasty and ill-considered action, we are convinced that the immediate removal of certain major obstacles to oil shale development could assure that operations would permit an industry be commenced in due course.

Wyoming's support was equally positive, but was tempered by concern that a large-scale leasing program could interfere with the trona mining industry, which was recovering sodium carbonate and bicarbonate from the oil shale beds in Sweetwater County, Wyo. Governor Hathaway provided the following statement to the Senate hearings:[H]

> I did want . . . to express before your Committee the great interest which Wyoming has in the development of oil shale and associated minerals. Secretary of the Interior Udall's announcement on January 27 of a five-point oil shale development program signals, we hope, a recognition by the Federal Government to bring our vast oil shale reserves into commercial production as early as possible , , . In summary, Mr. Chairman, let me say that Wyoming stands foursquare behind the immediate development of an oil shale and associated minerals industry.

Utah did not have an associated minerals industry, but the State did own substantial oil shale lands. Governor Rampton's statement conveys his support of oil shale development and the desire of the State to participate through leasing of its lands:[9]

> We are making available for lease to private industry our State owned deposits of oil shale and will continue to do so, We believe that the demand for energy will be such that conventional oil and gas resources will not meet our needs during the 1970's. Consideration of economic and national defense indicate need for development of a domestic synthetic fuel program . . . We urge that the program be implemented to allow private industry to develop both the State owned and the federally owned oil shale reserves,

As discussed later, Udall's initial leasing proposal was released for public comment in May of 1967. It offered leases, but restricted initial activities to research and development (R&D) on small areas of the lease tracts, No commitment was made to allow subsequent commercial operations on the same tracts. The initial proposal was strongly criticized by congressional delegates from Colorado, Utah, and Wyoming. The following statement by Utah Senator Bennett is typical of their reactions: '[0]

> I feel that the Department of the Interior should modify the proposed leasing regulations so that a healthy, comprehensive and ultimately profitable private industry can be developed on the public oil shale lands. The regulations as written will not, in my opinion, achieve that objective. I believe that the objective can best be achieved by strengthening private industry's role in developing the oil shale potential . . . I do not believe Government can match the efficiency and economy which are the natural results of industrial competition ., . I would suggest that perhaps Congress should assume the initiative in writing into law what I consider to be a reasonable and responsible leasing policy. In any event, I assure you of my continuing interest and support in Congress for early oil shale development.

Senator Dominick expressed his concern over the authority given to the Secretary of the Interior to select among lease applicants and to determine whether the results of the preliminary R&D efforts justified subsequent commercial leasing. His statement includes the following

> Although the participation of private enterprise is clearly contemplated, almost no incentive seems to be offered to encourage the same. What does one gain by engaging in the research and development program? Frankly. an onerous rcsponsibility and far too much discretion have been placed with the Secretary of the Interior.

In contrast. others in Congress raised equally strong objections to terms that appeared too lax and that might have permitted private development without significant returns to the public. This viewpoint was expressed at the Senate hearings by Senator Proxmire as follows: 12

> . . . we appear to know virtually nothing about the full extent or value of this precious resource and very 1ittle about development costs, problems, and processes , . . I have seen no evidence to indicate that it is essentrial, or even desirable to develop these shale oil reserves with the haste exernplified by the Secretary . . . 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 . . . The stakes are too high, and 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 . . .

In summary, the political environment when DOI was formulating its leasing policy was characterized by strong and conflicting opinions, statements, and pressures. On [he one hand, oil shale proponents in Congress, in the governments of the affected States, and in the oil industry favored development in the interest of economic benefit and national security. On the other hand, some vocal private citizens feared that private access to the Federal oil shale lands would lead to scandal and abuse of the public trust. This viewpoint was conveyed most strongly by Mr. Freeman, Other citizens and legislators feared that hasty action by Interior would lead to an untimely disposal of public resources and to profiteering by private industry.

It is likely that pressure from all sides affected Udall"s oil shale activities. Pressure in favor of rapid leasing undoubtedly spurred his efforts to prepare and promulgate leasing regulations. Counterpressures undoubtedly shaped the format and content of those regulations.

Energy and the Economic Environment

The energy situation and the economic environment in the early 1960's did not encourage heavy capital investment in a synthetic-fuels industry. Petroleum imports were restricted by quotas promulgated under President Eisenhower's Mandatory Oil Import Control Program. Production of domestic oil was still increasing, and oil prices in constant dollars were actually declining. The principal concern of domestic producers was that the quotas might be lifted, triggering a flood of underpriced foreign oil,

In the mid-1960's, this situation shifted as the Department of State began to encourage foreign trade under the mandates of the Trade Expansion Act of 1962. Petroleum imports were initially excepted from the expansion policy because of their threat to the domestic oil industry, which was generally recognized as important to national security. In 1965, however, the State Department took the position that increasing oil imports would be in the national interest, Particular attention was given to the importance of Venezuela's

petroleum industry to the economic and political stability of that country. In 1965, Assistant Secretary of State Douglas MacArthur II noted that: 13

> 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.

This policy was reflected in other executive branch departments, including DOI. Secretary Udall regarded relaxing import quotas as a viable mechanism for encouraging competition and efficiency within the domestic petroleum industry. This position was clearly expressed by Frank J. Barry, DOI Solicitor, in an address to the 1965 Oil Shale Symposium. 14

> The basic justification for the (oil import) program is the assumption that if this country became involved in a war, foreign oil supplies would be cut off and we would be dependent exclusively on domestic production. Therefore, the rationale goes, it behooves us to maintain an adequate domestic productive capacity, Hence, oil imports are restricted to a level which will not eliminate domestic producers from our own market and will justify their continued search for new oil fields and their improvement of refining techniques. Foreign oil, however, is highly competitive and its cheapness tends to sharpen the wits and encourage the perfection of the technical skill of domestic producers . , . You should note that , . , the worst feature of protectionism, namely, higher costs to the ultimate consumer, is limited by substantial import levels for cheap, highly competitive foreign oil.

Early in 1966, Udall began to rescind quotas on crude oil. Marked increases occurred in the quantities of petroleum that entered the Nation through eastern seaboard ports, despite the protests of domestic coal and oil producers, railroads, and utility companies, 's Udall subsequently announced that he favored eliminating quotas for refined products such as residual fuel oil.[16] Further reductions in import restrictions occurred in September of 1966, shortly before Udall announced his tentative leasing regulations for oil shale lands. '7

Oil imports were of concern to domestic energy companies considering involvement in Interior's oil shale program. As discussed below, domestic petroleum production was increasing, but reserves were declining, and efforts to locate new ones were largely unsuccessful. The companies had several options to assure a reliable flow of oil to their refining and distribution systems. First, they could continue exploration in the continental United States. Second, they could explore nonconventional areas such as Alaska and the Continental Shelf. Third, they could increase their reliance on imported crude and refined products, Fourth, they could develop synthetic liquid fuels from coal or oil shale.

Their strategies were affected by a number of technical, economic, and political factors, including individual corporate positions with regard to long-term petroleum and natural gas reserves, availability of investment capital, expertise in technologies for synthetic fuels, and Government policies. At the time that Udall's leasing proposals were being circulated, DOI's actions must have implied that the executive branch had adopted a policy of encouraging oil imports. This policy must have discouraged serious consideration of oil shale.

The Interim Report of the Oil Shale Advisory Board also was discouraging. Although several members emphasized the importance of developing oil shale as a national energy resource, Mr. Galbraith's opinion expressed the opposite point of view:[18]

> There is no showing of urgent economic or strategic need for oil from shale in the present or near future . . , Imports . . . 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 supply 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 nation-

al security justification for action that individuals or groups would find in their economic interest,

This position was later disputed by Captain Howard Moore, Director of Naval Petroleum and Oil Shale Resources, at the Senate hearings on Udall's January 1967, leasing proposal.[19]

> It is obvious from the standpoint of national defense that if the oil shale reserves are to make a significant contribution, there must exist at that time a viable oil shale industry. It is unlikely that sufficient time or resources will be available during a full scale emergency for development of such an industry . , , This is of great importance today because present trends indicate the United States is becoming a crude deficient nation and may in the future be forced to rely more and more upon imported fuels to meet even peacetime demands . . .

The following dialog subsequently took place between Captain Moore and Senator Allott, a member of the Committee:

> **Senator Allott:** I assume it is your point of view—it has been mine for a long time—that development of a viable oil shale industry is a necessity for the national defense and the national welfare.
>
> **Captain Moore:** It certainly is, Senator.
>
> Senator Allott: And I assume also . . . that the time is now, because . . . such processes ,.. are going to require a long leadtime and the investment of vast amounts of money.
>
> Captain Moore: Yes, sir.

Thus, although the Department of Defense favored rapid development, Galbraith and other economic and policy advisors continued to press for a more leisurely approach, in the belief that oil shale could not be a feasible resource either in peacetime or in time of war.

There was further discouragement early in 1968, when DOI published United States Petroleum Through 1980, a report that predicted future fuel requirements and forecast the roles of domestic and imported oil in meeting those needs, The report predicted that in 1980 the United States would consume approximately 6.5 billion barrels (bbl) of petr~ leum liquids, with domestic oil production supplying about 64 percent and domestic natural gas liquids and condensates an additional 16 percent. Only about 20 percent would be obtained from foreign sources.[20]

The report was a study in contrasts. It optimistically projected U.S. petroleum production but documented the declining discoveries of new reserves. These discoveries peaked between 1950 and 1957 and afterwards declined steadily to less than 3 billion bbl per year in 1965. However, the report assumed that domestic oil industry could contribute over 4 billion bbl per year in 1980. This seeming inconsistency was rationalized by the assumption that additional discoveries could be encouraged or even forced by the Government's import limitations, tax structures, R&D expenditures, and leasing policies: industry would find more oil if Government made such discovery essential or economically attractive.

The report's most significant conclusion about synthetic fuels was that they would not be needed before 1980 and not even then unless the 20-percent reliance on oil imports became a subject of national concern. According to the report, synthetic fuels such as shale oil would not be developed in the 1960's and 1970"s because the processing technology was unpredictable, primitive, and expensive. Private capital would not be invested, it concluded, because profitability and capital recovery would always be threatened by cheap oil imports.

The same conclusions were stated by Walter Hibbard, Jr., of the U.S. Bureau of Mines (USBM), in testimony before the Senate Subcommittee on Minerals, Materials, and Fuels in March of 1968. He cited a USBM study of the potential need for shale oil and the opportunities and constraints on its development. The study concluded that :[21]

> Although the vast domestic resources of oil shale contain the equivalent of 70 times the present domestic proved reserves of crude petroleum, commercial development is

> complicated by technologic gaps and economic and environmental problems. Reduction in production costs is prerequisite to the emergence of a significant commercial shale oil industry,

The study also concluded that, unless problems could be solved in the near future, significant production would probably not occur before 1980.

These reports forecast a bleak future for the industry. First, DOI assumed that synthetic fuels would not be needed before 1980 because new oil would be found before serious supply problems occurred, Second, through its control mechanisms, the Government would continue to suppress the price of conventional petroleum to below the cost of producing synthetic fuels. Third, oil shale processes were regarded as technologically and economically unsatisfactory.

The oil industry therefore minimized oil shale activities and instead sought new petroleum reserves, Attractive but expensive exploration opportunities were pursued in Alaska, in the Santa Barbara Channel, and on the Continental Shelf. Little excess capital was available for ventures like oil shale development which offered little promise of substantial short-term gains and which would be influenced by a Federal agency whose commitment to their success was unclear.

The decision to seek new oilfields rather than to develop oil shale was favored by Federal tax policies. Crude oil producers were allowed to write off certain exploration and development expenses, which often amounted to over 75 percent of total drilling costs, In essence, most costs associated with conventional oil discovery were tax deductible—an advantage not to be enjoyed by oil shale developers who would be forced to invest after-tax profits and then amortize the large front-end expenses over a period of many years, Crude oil producers also enjoyed a depletion allowance of 27.5 percent of the value of the oil at the wellhead. The depletion allowance for oil shale was set at 15 percent of the value of mined and crushed shale prior to oil recovery. Because raw oil shale has very little value, the depletion allowance was worth only about $0.05/bbl of shale oil after taxes. If shale oil were given the same depletion allowance as conventional crude oil (27.5 percent of oil value), the credit would be worth about $0.40bbl Therefore, oil shale proponents complained, taxation policies favored conventional crude oil over shale oil by a factor of eight.

In summary, at the time that Secretary Udall was preparing his leasing proposal, industry was not convinced of DOI'S commitment to oil shale development because the Department appeared dedicated to conventional petroleum for at least another decade. The high costs of seeking new oil left little surplus capital for oil shale, which was fiscally unattractive under Government taxation policies, In view of these circumstances, it is probable that industry would have responded negatively to any Federal oil shale leasing proposal, and especially to the uniquely structured proposals that were presented in 1967 and 1968.

An Initial Leasing Program

In November 1963, Secretary Udall called for public comments on the formulation of new oil shale leasing procedures.[22] Over 200 responses were received. Assistant Secretory of the Interior John Kelly summarized these comments at the First Symposium on Oil Shale in 1964.[23] According to Kelly, a majority of the comments recommended that Hoover's withdrawal order be rescinded immediately and that leases be issued for private development on a first-come, first-served basis. DOI was not prepared to accept this recommendation because, in Kelly's words:

> The simple rescinding of Executive Order No. 5327 would create more problems than it would solve and would not be in consonance

> with the many changes and amendments made by the Congress in the Mineral Leasing Act of 1920, and with the regulations promulgated by the Secretaries of the Interior under these laws.

Kelly also felt that the comments received did not touch on two crucial policy areas: the role of shale oil in the Nation's total energy complex and its effects on developing economies in the rest of the world.

Udall then appointed an Oil Shale Advisory Board to analyze the commercial potential of the Nation's oil shale deposits and to recommend specific plans for implementing their development by private interests or Government agencies, Its members were:

- Joseph L. Fisher, president of Resources for the Future, Inc. (Chairman of the Advisory Board);
- Orlo E. Childs, president of the Colorado School of Mines:
- Benjamin V. Cohen, attorney from Washington, D. C.;
- John Kenneth Galbraith, professor at Harvard University:
- James M. Gavin, chairman of the board of Arthur D. Little, Inc.;
- Milo Perkins, economics consultant from Tucson; and
- H. Byron Mock, attorney from Salt Lake City,

Their four meetings, between July 1964 and January 1965, included a field trip to the oil shale region, presentations by Federal officials, and testimony from representatives of industry, the Colorado State government, trade associations, and other interested groups. The Board's Interim Report was submitted in February 1965.[24] (There was no final report,)

The 12-page report was accompanied by six minority opinions, one from each member except Gavin, who had attended only the first meeting and resigned before the report was prepared, One analyst has likened the interim report to "six dissents saying nothing. "[25] Udall's appraisal was conveyed in subsequent testimony before the Senate Interior Committee:[26]

> Although there were divisions of opinion, I felt the report was extremely usefuI, And I still feel that way, because I think, like a great searchlight, it illuminated the whole landscape, It illuminated all of the policy alternatives . . . I personally feel most strongly that the Oil Shale Advisory Board and every member on it made a very big contribution in focusing on this (leasing policy) as the controversial question. As a consequence, I think the whole problem is illuminated and we at least know what some of the alternatives are,

According to Chairman Fisher's transmittal letter, the members concurred in the following general concerns:

> All members agree that the public interest should be safeguarded, however and whenever the resource might pass into a commercial development phase. The public interest includes careful attention to the conservation . . . of community, recreational, and scenic values, as well as the wise use of mineral resources. It also includes protection against speculation in public land leases , ., The Board agrees that the Federal government, working in appropriate cooperat ion 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.

The following specific policy objectives were suggested:

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;
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 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; and
6. to set up whatever Federal program may be decided upon in such a way that it can be administered effectively,

The Board effectively returned full responsibility for policy development and program design to DOI but did provide several alternate policy recommendations. The following three options were suggested for consideration:

1. continue Hoover's withdrawal order and initiate Government research (including contracts with private firms) to develop conservation standards and practices and to determine a market value for shale oil, then use this value as the basis for subsequent leasing regulations; or
2. rescind the withdrawal order and offer a few commercial-size tracts for competitive leasing by private industry with mandatory due-diligence and performance requirements to prevent speculations; or
3. modify the withdrawal order but restrict initial leasing to a few small research-size tracts with the option for commercial leases contingent upon commercial viability of the recovery processes to be developed.

Option 1 was endorsed by Galbraith and echoed the opinions of some economists and Government officials who feared that any commercial leases would be purchased for speculative purposes. In their opinion, the Federal lands thus accessed would not be used to develop an industry but rather would be hoarded for the time when conventional petroleum reserves were exhausted. By this technique, they feared, the oil companies would prevent others from establishing an industry in competition with conventional petroleum. Without a competing domestic supply system, the companies could press for continuation of favorable policies such as quotas on imported oil and high depletion allowances for domestic crude producers. Concern over speculation was coupled with a suspicion that shale oil could ultimately prove to be much cheaper than conventional crude oil.

One of Galbraith's major concerns was that, without firm economic data, the Government would have to rely on industry estimates of the true cost of shale oil extraction. Immediate leasing of large tracts was considered undesirable until this true cost could be better defined. If shale oil were actually cheap, release of Government reserves would constitute a massive giveaway to the oil companies. If oil shale economics were marginal, the companies would buy up the leases to prevent others from entering the energy field. If costs were too high, leasing would be of no value because no shale oil would be produced for many years, if at all.

In summary, Galbraith's position was that private lands were adequate for initial field-testing of oil shale technologies and that no Federal lands should be released until the value of the resource was established through Government research. His position was summarized in his minority opinion:

> 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 . . , 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 seemed 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,

Cohen concurred with most of Galbraith's principles but also favored Option 3 (research leasing), provided that the private re-

search was closely scrutinized by the Government to ensure that the lessees were not simply hoarding resources. Fisher agreed that private lands were adequate for R&D, but he supported leasing of research tracts and favored accelerated Government research (including private contracts) in case industry did not respond to the lease offering. He also recommended that the Government announce its intention to offer commercial leases upon completion of the research phase. He suggested that commercial leases be restricted to companies that either participated in the research-tract program or conducted equivalent research on private lands.

Childs, Perkins, and Mock favored Option 2—immediate offering of a limited number of commercial leases. Childs warned that research leases would not interest industry unless they were the first stage in a commercial leasing program. Mock recommended that the lease terms be attractive to industry, particularly with respect to tract size, and suggested that each tract be 5,120 acres, the maximum allowed by the Mineral Leasing Act of 1920, He also recommended that industry participate in tract nomination and suggested an adjustable royalty so that both industry and Government could receive fair returns, Perkins saw no need for the Government to become involved in process-related R&D and recommended that such activities be left to industry. He suggested Government research in the areas of health and conservation standards, water use, environmental considerations, and geological exploration,

Thus, in early 1965, Secretary Udall found himself in a rather difficult position. The suggestions of potential developers and the general public conflicted with some of DOI's fundamental policies and did not address national and international energy needs and supply strategies. Udall had then attempted to elicit expert guidance from the members of the Oil Shale Advisory Board, who agreed on general goals but disagreed on appropriate policies. Some members maintained that research was mandatory to prevent speculation and to avoid a massive giveaway, Others held that research leasing alone, without a commitment to subsequent commercial leasing, would fail. In any event, research alone would not convey the economic benefits that were desired by oil shale proponents in Congress. Finally, there was no assurance that industry would respond favorably to any program because the severity of the energy-supply problem was not universally acknowledged, and shale oil was unfavorably regarded compared with domestic petroleum and with the then reliable oil supplies from Middle East fields.

Udall's predicament was complicated by the fact that some Senators and Representatives strongly opposed providing the oil industry with access to the public's oil shale resources, while others wanted Congress to consider new legislation to force a leasing program. If enacted, such legislation would have preempted DOI'S control of the oil shale lands and could have run counter to DOI'S policies.

The situation was further complicated in 1966 by a rush to file new mining claims on the Federal oil shale lands, precipitated by the discovery of dawsonite. Dawsonite is a potential source of aluminum—a locatable mineral under the Mining Law of 1872—and the private claimants believed that location of dawsonite claims could eventually lead to acquisition of the Federal lands that contained the mineral. Dealing with these efforts occupied much staff time within DO1 during 1966 and probably delayed the formulation of leasing policies.

The next milestone in policy development was reached on January 27, 1967, nearly 2 years after the Oil Shale Advisory Board submitted its report. On that date, Secretary Udall announced a comprehensive five-point program that reflected most of the concerns and suggestions of the Board members. [z] Its principal objectives were:

1. to clear titles of oil shale lands and to resolve ownership disputes that were inhibiting private investment in oil shale development;

2. to allow consolidation of scattered private holdings through land exchange, thus creating more private sites suitable for large-scale development;
3. to investigate nuclear in situ oil shale processing;
4. to conduct a lo-year federally funded research program to establish oil shale's economic potential and shale oil's market value; and
5. to sell provisional development leases that would allow limited private access to Federal oil shale lands.

Although details were not provided in the announcement, all objectives appeared at least mildly favorable to industrial cooperation.

The proposed program addressed many issues influencing development, The first objective would have clarified the ownership of disputed Federal lands and would have simplified any subsequent leasing program. The second would have permitted private landowners to consolidate their lands and to pursue development from a more favorable posture, If this had been accomplished, leasing of public lands might not have been so important. Nuclear processing, the focus of the third objective, appeared promising at the time and further study could have benefited industry. The research program (point 4) was primarily to determine fair values for oil shale products so that the Government could ensure an equitable return from subsequent leasing. Industry, too, certainly would have benefited from technical, economic, and resource-appraisal R&D,

With regard to point 5, the announcement stated that only provisional leases would be offered, and commercial leases would not be sold until R&D had been successfully performed on the research tracts. Udall did not describe the lease terms, but the term "provisional" was disturbing to industry in view of Orlo Childs' contention that restricted research leases would not attract industry, Industry's pessimism was not eased by the general tone of Secretary Udall's presentation, which included the following statement:

> The public interest requires that in our efforts to develop the technology of extracting oil from shale, we write into every rule, regulation, contract, and permit affecting the public lands those terms and conditions that will: encourage competition in development and use of oil shale and related mineral resources; prevent speculation and windfall profits; promote mining operation and production practices that are consistent with good conservation management of overall resources in the region, encourage fullest use of all known mineral resources; provide reasonable revenues to the Federal and State Governments.

This cautious position was further emphasized by the specific lease terms, which were published on May 10, 1967.[28]

The leasing proposal called for allocating 30,000 acres of Federal land to R&D. This area would be divided into several individual tracts, with the size of each tract dependent on the quantity and quality of the contained oil shale resources. Lessees were to be selected by the Secretary on the basis of proposals and according to demonstrated need for access to Federal land. Competitive bidding was not to be used. Tracts could be as large as 5,120 acres. However, for the first 10 years, the developers would be restricted to relatively small areas where small-scale research was to be conducted. Diligent R&D was mandatory, and unless the lessees sustained some level of progress, the leases could be revoked. This requirement assured that leases would not be purchased for resource-holding purposes nor to prevent other potential developers from gaining a lead in process development.

To assure diligence, and to enable DOI to obtain a true picture of the costs of oil shale development, DOI required that the lessees disclose all technical data acquired. Patent rights for all technologies developed on the research tract would revert to the Government. The disclosure requirement, coupled with the patent provision, effectively removed a major incentive by eliminating any possibility that technical advantages might

accrue to the lessees as a result of their research expenditures,

After the lo-year research phase, if DOI and the lessees were so inclined, and if DOI believed that commercial viability had been demonstrated, the research leases could be extended to cover commercial development. No royalties would be paid to the Government for shale oil produced until the commercial leases were executed. However, the Secretary reserved the right to approve extensions and to determine how much of each lease tract would be opened for commercial activities. He also reserved the right to mandate the royalties for the commercial phase. A minimum royalty of 3 percent of the gross value of mineral products was suggested. If the commercial venture proved profitable, the Government would share in the profits through a variable royalty, which would range from 10 percent of net income in excess of 10 percent of capital investment, to 50 percent of net income in excess of 20 percent of capital investment.

These terms reveal the influence of the Oil Shale Advisory Board, Chairman Fisher's recommendation of research leasing is evident, as are his suggestions for Government R&D and for subsequent commercial leases restricted to those companies that purchased research leases. Cohen's concern over due diligence was adequately addressed, as was Mock's recommendation of a variable royalty, with the size of the royalty left to the discretion of the Secretary. Childs and Perkins recommended commercial leases; these might be allowed but not for at least 10 years after the research leases were sold. Galbraith's concern over the unknown but probably enormous profit potential of oil shale is evident throughout.

The January announcement of the program's framework and the May publication of tentative leasing regulations were both part of Secretary Udall's efforts to evolve an oil shale program that would be acceptable to oil shale opponents and proponents alike. He sought comments on the general framework and used them {in part) to structure the tentative regulations. The Senate Committee on Interior and Insular Affairs provided a forum for receiving comments, for assessing Udall's response, and for providing congressional guidance, The committee conducted two hearings on the program that emerged in 1967. The first, in February, received comments on the program announcement. Joseph Fisher, former chairman of the Oil Shale Advisory Board, acknowledged that the five-point program was largely based on his recommendations. He re-emphasized the need for research to address the unknown value of oil shale and the possible effects of its extraction. [29] Colorado's Governor Love recommended rapid action on the oil shale question.[1,)] The Director of Naval Petroleum and Oil Shale Resources expressed the Navy's interest in oil shale development as a means of providing fuel for national defense.[31] The American Federation of Labor and the National Farmers Union testified regarding distribution of any Federal royalties that might accrue from oil shale leasing. '2 Sinclair Oil warned that oil companies would not invest in research unless assured of eventual commercial operations. And Western-State congressional delegates and the Governors of Utah and Wyoming expressed their continued interest. [34]

Many of the witnesses and committee members conveyed their appreciation of DOI'S progress. However, little was heard from the major oil companies that were most likely to respond to any leasing proposal. Some industry officials expressed concern over the research focus of the leasing proposal, and advice was offered for improving its terms.

The second set of hearings was conducted in September—after the tentative leasing regulations were published. It was during these hearings that Utah's Senator Bennett expressed his concern about Government interference with private enterprise, that Colorado's Senator Dominick spoke regarding the "onerous responsibility and far too much discretion" given the Secretary, and that Senator Proxmire called for "a halt to the present hasty administrative effort. "

Industry's reaction to the leasing regulations was almost universally unfavorable. In his testimony, Secretary Udall summarized the 36 specific comments submitted to his office. According to DOI's analysis, major concerns were expressed in 10 specific areas: the size of the royalties, the term of the leases, the acreage to be allowed for research and commercial activities, the noncompetitive selection process, the relationship of leases to operations for recovering associated minerals, the disclosure requirements, the discretionary authority given to the Secretary, the restrictive provisions for land exchanges, and miscellaneous provisions for conflicts with unpatented mining claims and automatic termination in the event that commercial operations ceased for any reason.

The position of most of the oil company respondents were summarized by an official of Continental Oil Co.:[35]

> Our reaction is not a favorable one. Overall it is our view that the rights to be granted are circumscribed with restrictions and conditions to such an extent that sufficient economic incentive will be lacking. It is our view that private industry will not be warranted in making the necessary capital, organizational, and technological commitments which will be required.

These sentiments were echoed by an official of Sun Oil Co. :[36]

> The proposed requirement on the disclosure of research information . . . would make it impossible for a company to develop technology processes or engineering design in formation without giving that information to all other companies. This provision completely removes the incentive for carrying out a proprietary research program and is in direct conflict with the free enterprise system,

The president of Union Oil Co. analyzed the profit-share royalty provisions of the regulation:[37]

> 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,

In summary, industrial officials stressed financial uncertainties and warned that the elimination of proprietary rights to technical information would prevent companies from committing venture capital. Even if research were diligently pursued and feasible processes were developed, subsequent commercial operations could not be assured of acceptable profits because the Secretary could impose extremely high royalties. In any case, the phased leasing approach (uneconomical research leases, followed perhaps by commercial leases of unknown quality) would necessitate large front-end capital commitments without guarantee of adequate returns.

A Revised Proposal and Its Demise

Secretary Udall described his next course of action as follows :[38]

> We are carefully studying these comments to test out our assumptions and to improve our approach , . . Aided by these comments . , . we already have underway 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.

The study group consisted of DOI personnel and experts from the Bureau of the Budget and the Council of Economic Advisors. The mid-January milestone passed, and on February7, Secretary Udall stated that the group

had not yet provided definite recommendations to either modify the proposed regulations or to re-issue them in unmodified form. 39 The group's report, Prospects *for Oil Shale* Development—Colorado, Utah, and Wyoming, was finally released on May 29, 1968.[40] It recommended that DOI test the "market potential" of oil shale by leasing two different types of deposits (one thin but outcropping, and one thick and buried), each sufficient to supply a 35,000- to 50,00@ 0-bbl/d plant for 20 to 30 years. It was recommended that the test leases be offered before the end of 1968 and that they be followed by production leasing within 5 years, The test leases were not fully described but their general framework departed significantly from Udall's May proposal for research leasing.

During the next few months, DOI expedited creation of a new leasing proposal that could be released before the presidential election in November 1968. Secretary Udall first requested comments on the general concept of test leasing as outlined in the DOI study report. About 26 responses were contributed before the closing date of August 31.[41] In generai, industry's responses were quite favorable and commended the Secretary on his abandonment of the research leasing regulations. The major consistent objection was to the proposed sizes of the lease tracts, which industry representatives claimed were too small for economic operations. Few comments were received from private individuals. The Colorado newspaper editor Freeman, who had presented scathing testimony at the 1967 hearings, furnished the following comments:

> 1 request that you stop certain undesirable features of the . . . program . . . which point to fraud in the Interior Department operations, if not fraud in the Justice Department and in Congress as well . . . The report, in my judgment, evidences a great desire on the part of the Department and its officials to conceal the oil shale . . . scandals which dwarf the Teapot Dome affair by at least a hundred times.

Senator Proxmire characterized the report as a "significant step" but re-emphasized his desire for research to help the Government determine a fair value for its oil shale resources. He also questioned the need for leasing, given the extent of the private holdings.

On September 10, DOI designated and described three test-lease sites and set forth rules by which interested companies could drill exploratory coreholes on the sites. Each tract was sized to supply a 125, 000-bbl/d facility. This size was larger than recommended by the DOI study group and apparently reflected industry's desire for adequate resources. The initial deadline for exploratory drilling was November 15, but it was subsequently extended to December 12. The Oil Shale Corporation (Tosco) and Atlantic Richfield drilled coreholes on two of the proposed tracts. Shell Oil Company drilled on one of the same tracts. No exploration was conducted on the third tract.

On September 27, DOI published a first draft of the proposed lease form, which was modified on October 2 and October 14. On November 1, interested firms, were sent legal descriptions of the tracts and were invited to submit sealed bonus bids for their leases. Bids were to be submitted by December 20, after the November presidential election.

The final version of the lease form was published on November 5. Its provisions were much less restrictive than those of the May proposal. Industry was allowed to retain patents and technical information acquired on the tracts, However, the Secretary was to be provided with all of the information acquired during tract development, and licensing of any new technology not related to refining was required. Royalties for in situ operations were fixed at 12.5 percent of the value of shale oil produced. The royalty for above-ground retorting was to be calculated on a sliding scale, with a royalty of $0.14/ton of shale mined imposed for shale yielding 30 gallons of oil per ton (gal/ton). (These royalties

were roughly equivalent to those for oil and gas.) In addition, minimum royalties of from $10 to $50/acre were to be collected after the eighth anniversary of the lease. Minimum royalties on the largest tract would have amounted to over $100,000/year and should have acted to discourage speculation, at least by small investors if not by major oil companies. As with the earlier proposal, development was to be phased. However, the types of activities to be conducted during the R&D phase were not restricted, and lessees were assured that commercial development would be permitted.

Cameron and Jones, Inc., a firm with extensive experience in the field of synthetic fuels, supplied the following analysis of the lease offering:[42]

> We believe that the . . . program is a major and significant step towards the development of an oil shale industry, Several provisions of the test lease form, however, and the timing of the entire programs coupled with what we believe to be less than prime oil shale lease sites, result in our conclusion that the program will not achieve the objectives for which it was designed. Seldom have we felt so strongly compelled to interject recommendations for industry action within the pages of this report. In this instance there appears to be a very real possibility that if the test leasing program is not successful, industry's reason for nonparticipation may be misunderstood. Already the word "apathy" has been used by news media to describe industry interests. For this reason we strongly recommend that each company not intending to participate . . . state their reasons in writing to the Secretary of the Interior.

DOI expected to receive several bids of $20 million to $30 million for each tract, In fact, only three bids were submitted. One bid ($625.00) was provided by a drilling operator. The other two were submitted by Tosco: $249,000 (for a lease valued by DOI at $30 million) and $250,000 (for a lease for which DOI expected to receive $20 million). The bids were rejected, and the program was canceled.

Reasons for Failure of the 1968 Program

The 1968 leasing attempt failed because:

- the energy-supply situation and the economic environment were not conducive to investment in synthetic fuels;
- DOI did not appear committed to oil shale development;
- taxation policies favored conventional petroleum over oil from shale;
- according to industry, two of the lease tracts were too small (1,251 acres) to permit long-term commercial development;
- industry was not involved in lease-tract nomination, all feasibility studies were conducted within DOI; and
- only 3 months were allowed for potential lessees to evaluate resource areas covering several square miles.

The final point was crucial, because some of industry's attempts to characterize the tracts provided very discouraging information, which might have been countered if time had permitted detailed exploration. For example, Tosco detected extensive ground water aquifers above the mining zone on one tract, and found geological defects that might have precluded mine development. One of Tosco's bids included a $20 million delayed bonus-bid provision that would have been executed if subsequent exploration refuted the initial findings. DOI declined the offer.

In summary, Secretary Udall was diligent in his attempts to develop an acceptable oil shale program. He was subjected to political and public pressures both for and against private oil shale development. He attempted to formulate a leasing program that would relieve both types of pressure, but his early proposals produced strong negative reactions from private firms. His ultimate lease offer-

ing, although deficient in some areas, might have attracted positive industry response if the business climate had been different. The offering was certainly affected by its hasty promulgation between May of 1968 and the presidential election in November.

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[42]Ibid., at p, 12.

CHAPTER 3

Evolution of the Prototype Program (1969-74)

CHAPTER 3

Evolution of the Prototype Program (1969-74)

Introduction

Under President Nixon, the Department of the Interior (DOI) organized an extensive R&D program that included an evaluation of the nuclear approach to in situ processing, mining and rock mechanics studies, resource exploration, mineral processing experiments, and other efforts, Out of this program came an improved understanding of the nature of the resource and of the problems inherent in its development. At the same time, the Government intensified its efforts to clear clouded titles to the oil shale lands in its control, an activity that would have simplified the process of leasing those lands for private development. Little progress was made towards consolidating scattered private tracts, partially because of a lack of interest on the part of industry and partially because of DOI'S involvement in the clouded-title issue.

The congressional climate in the early years of the new administration was similar to that in the 1964-68 era in that industry, State government officials, and Western State congressional delegates continued to press for leasing of public oil shale lands, under the rationale that this was the fastest way to create a large-scale oil shale industry.

In 1969, DOI began structuring the Federal Prototype Oil Shale Leasing Program which, like the 1968 attempt, was intended to be a first step towards an expanded leasing effort. This chapter discusses the forces that motivated the Government to initiate the Prototype Program and describes the energy-supply and economic factors that affected its emergence. Discussion ends with the lease sales in 1974. The conduct of the Program since then is discussed in the following chapter.

The Political Environment

As discussed in chapter 1, DOI administrators prior to the Nixon administration were concerned about the possibility of creating leasing scandals like Teapot Dome. They therefore resisted pressure by industry and regional political interests to lease public oil shale lands in the Western States. Industry and Western State officials were largely excluded from policy and program design, despite their keen interest in the implementation of a successful leasing program. DOI'S initial leasing proposal reflected a cautious approach to dealing with industrial developers, and industry rejected its terms. The second proposal was hastily conceived and although its terms were much more liberal, time constraints and the prevailing energy-supply situation contributed to its failure.

In contrast, the DOI officials appointed by President Nixon took the position that private industry should be involved in developing the public's oil shale resources, Under Secretary Hickel, DOI sought to develop a leasing program that would assure enthusiatic industry response. The effort was continued by Secretary Hickel's successor, Rogers Morton.

In his June 4, 1971, Clean Energy Message to Congress, President Nixon instructed the Secretary of the Interior to expedite a leasing program that would lead to oil shale development on public lands. By June 29, DOI had prepared and released a program statement and a draft environmental impact statement (EIS) for the Prototype Program, Leases were to be sold about 18 months later, in late 1972. DOI also drafted the Mineral Leasing Act of

1971 (S. 2726), which would have doubled the maximum size of a lease tract (from 5,120 acres under the Mineral Leasing Act of 1920 to 10,240 acres), and would have increased the number of leases that could be held by one individual or association from one for the entire United States to one per State.

In commenting on the emerging oil shale program at 1971 Senate hearings, Assistant Secretary of the Interior Hollis Dole made the following statement about the desirability of private participation:[1]

> There is a strong increasing interest and support by State and local governments, industry, and the general public in oil shale development. We believe the proposed program can accomplish its stated goal and provide a new source of energy for the Nation by stimulating the timely development of commercial oil shale technology by private enterprise . . . I know I do not have to call it to your attention, but I do want to reiterate, that the name of the game and the way we do business here in our country is under the private enterprise system. So, therefore, I think we should give it the broadest latitude in allowing it to work.

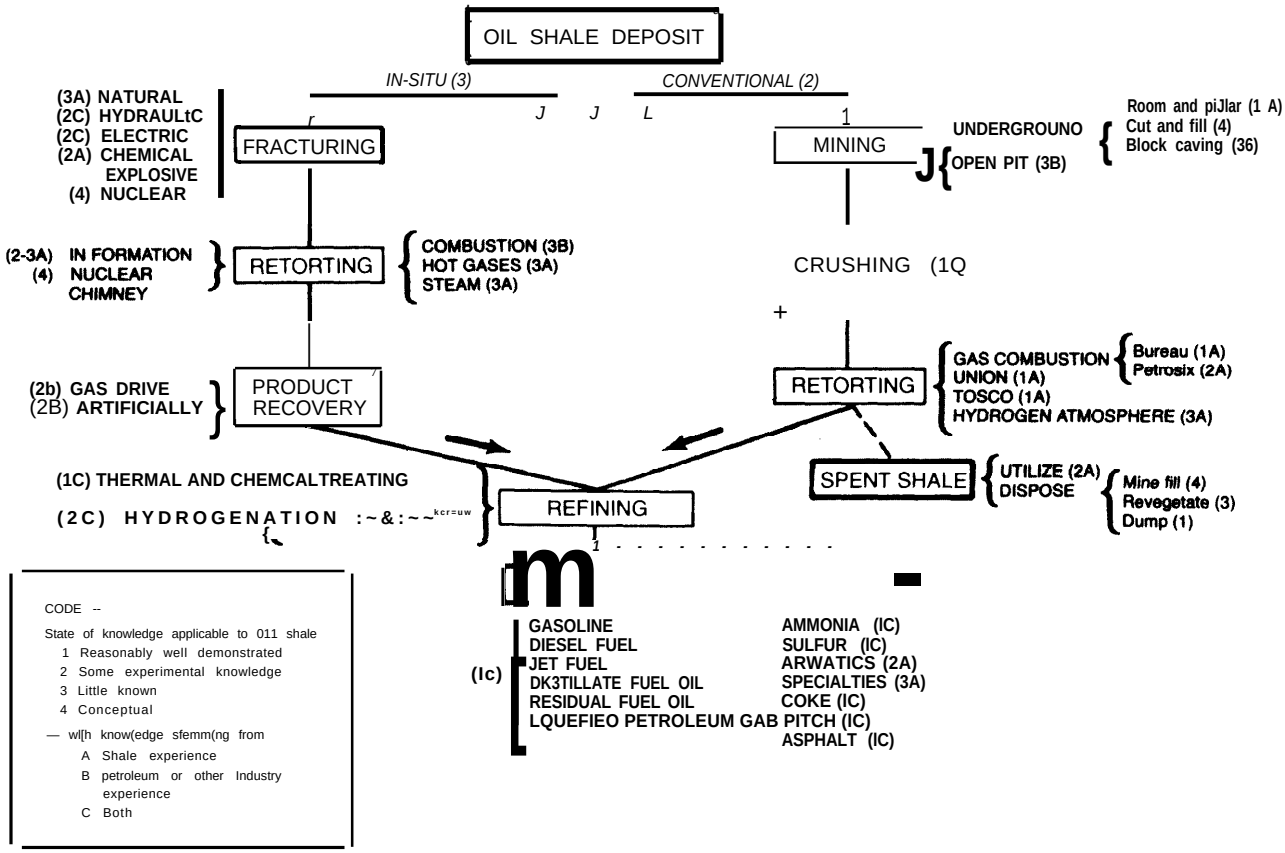
DOI officials were consistently opposed to Government involvement in oil shale commercialization other than leasing. An example is DOI'S response to S. 2510, which was introduced by Senator Moss of Utah in 1971 to provide a Government-owned development corporation. In his testimony on the bill, Assistant Secretary Dole commented:[2]

> . . . we feel that industry is capable and willing to assume the enormous costs that are involved. We feel that by putting this solely and largely upon the private sector that more people will become involved in this and more rapid progress will be made because of the need of private industry to get a return on their investment , . . As far as oil shale is concerned, we feel very definitely that private enterprise can develop it, and because of the various admonitions by Congress we feel they should be allowed to do so , . . We believe that S.251O . . . runs counter to the philosophy of the present Mining and Minerals Policy Act, which specifies that the Government's principal role is to encourage private enterprise to develop the Nation's mineral resources . . . Positive Federal leadership—without undue intrusion into the proper concerns of the private sector—is the other ingredient needed to provide the economic and administrative climate necessary to foster . . . fuels development under private initiative.

The administration's patent policy announced on August 23, 1971, which permitted private participants in Federal programs to retain patent rights, is further evidence of its philosophy about private development of public resources. Secretary Udall's desire to protect the Federal interest in oil shale technology was a major concern to industry during the 1964-68 leasing attempt, Under Secretary Morton, the issue of proprietary rights was resolved in favor of the private parties. Most of the questions about the proper nature of Government-industry relationships that inhibited DOI'S policy development under the previous administration appear to have been replaced by uniform support for private involvement.

DOI acknowledged that, technically and economically, oil shale development was still not completely feasible. However, the real barriers to commercialization were believed to be largely legal and political, DOI'S perception of the technical status of oil shale operations is indicated in figure 1, taken from the 1968 publication Prospects for Oil Shale Development t—Colorado, Utah, and Wyoming. As shown, several years before the Prototype Program began, DOI regarded such basic operations as aboveground retorting, underground mining, upgrading, and product utilization to be reasonably well developed. Other operations such as aboveground mining, in situ fracturing, and spent shale disposal were not well understood and needed further research. Economic aspects were also not clearly defined. However, estimates based on pilot plant and semiworks studies indicated the possibility of commercialization, given a sound resource base supported by a research, development, and demonstration program. The resource base was to come from the Prototype Oil Shale Leasing Pro

Figure 1 .—Status of Oil Shale Technologies in 1968



SOURCE *Prospects for 011 Shale Development — Colorado, Utah, and Wyom{ng,* U S Department *of* the Inter{ or, May 1968, p 47

gram, and support from DOI'S research arms, e.g., the Bureau of Mines and the Geological Survey.

Political and legal problems related to clouded land titles, rights of private access to Federal mineral lands, restrictions on proprietary information, and the definition of a fair return for the public's resources were harder to address in a single development program. DOI believed that with a proper leasing program, the technical and economic uncertainties would be resolved, and there would be time and motivation to clarify the complex legal and political issues. Therefore, DO1 proceeded to prepare a set of guidelines for immediate leasing action, and to encourage the involvement of industry and the affected States in all phases.

The guidelines and accompanying actions were soon affected by emerging environmental regulations, Because of the passage of the National Environmental Policy Act (NEPA) in 1969, DOI was forced to give unprecedented consideration to the environmental aspects of oil shale development in developing the leasing procedures. Such issues had not been emphasized previously. By the time of the Prototype Program's inception, however, environmental concerns were becoming institutionalized as protective measures were enacted at all levels of government.

NEPA had an immediate effect on the Prototype Program. Although a preliminary EIS was issued for the Program in 1971, potential environmental effects were described only in vague and general terms, The EIS was strong-

ly criticized during hearings on the Program. Special attention was given to its treatment of land reclamation problems, air quality and water quality impacts, and effects on wildlife, as well as the absence of an assessment of alternate energy sources.] In 1971 and 1972 court decisions in Calvert Cliffs Coordinating Committee v. the Atomic Energy Commission and the Natural Resources Defense Council v. Morton required that development alternatives be considered in any environmental statement prepared under NEPA. * Because DOI'S preliminary EIS considered no alternative programs, it was therefore inadequate under the law.[4] The statement was withdrawn and a much larger and more comprehensive document prepared.

In summary, the political environment within the executive branch was quite different from the one that dominated the 1964-68 program, A major DOI objective was to facilitate a leasing program to allow the federally controlled oil shale resources to be privately developed. At the same time, DOI had to contend with the new system of environmental legislation, and to structure the leasing program to ensure that the development of the oil shale industry complied with environmental laws. Balancing these objectives was often difficult because not all of the implications of the laws were clearly understood at that time.

*Calvert cliffs Coordinationg committee Inc. v, U.S Atomic Energy Commission, 449 F.2d 1109 (D.C. cert. denied, 404 U.S. 942: National Resources Defense Council v. Morton, *458 F. 2d 827 D.C.* Cir.1972). F'or a discussion of the legislalive history and intended effect of the requirement for an environmental impact statment, see Richard N. L. Andrews, ''Impact Statements and Ipact Assessment, in Environment tal Impact Assessment (Marian Blisset ed.). Engineering foundation, 1975, at pp. 16-18.

Energy and the Economic Environment

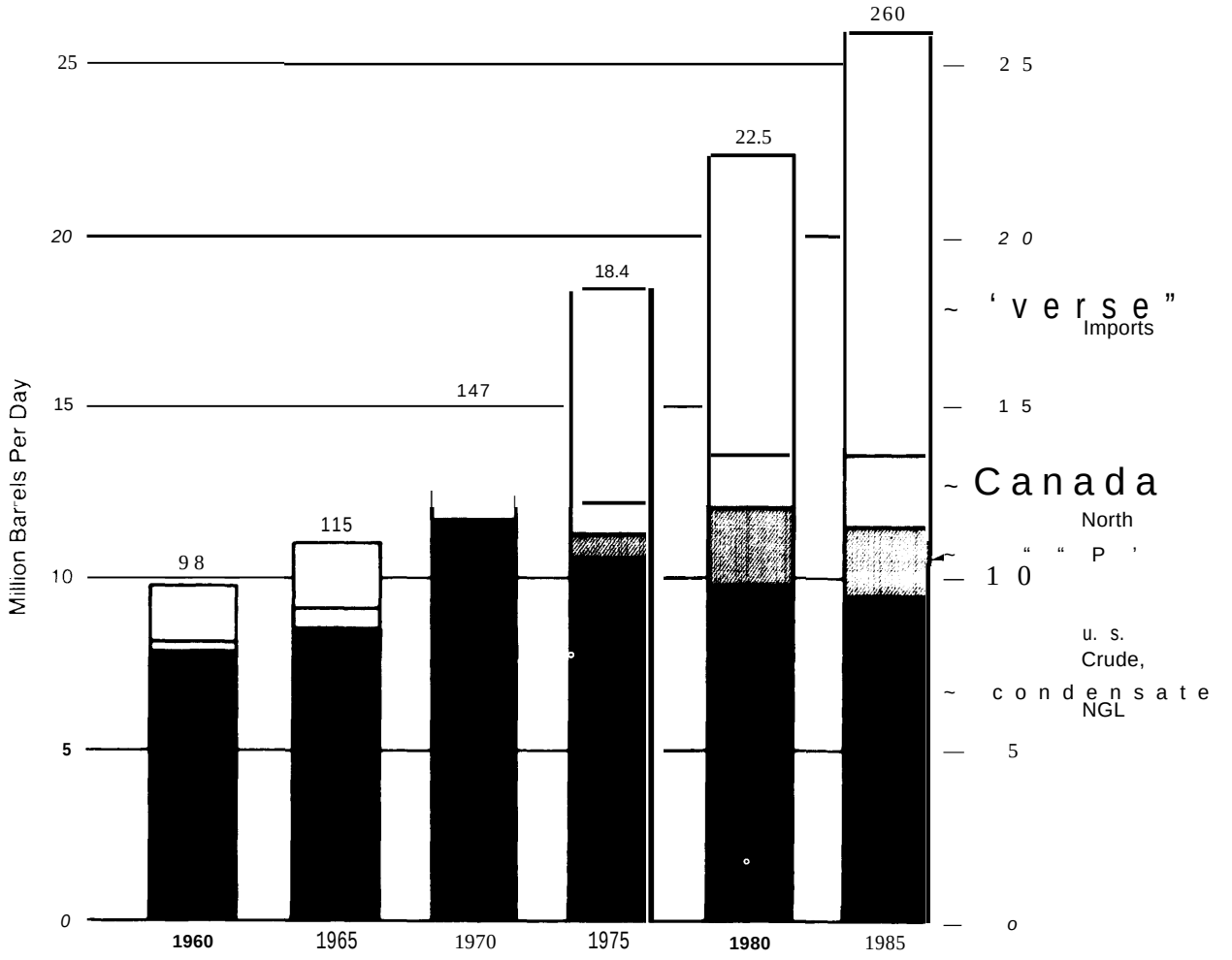
There were at least two reasons why the Prototype Program had strong backing from the executive branch of the Federal Government. First, the administration viewed oil shale development as an integral part of its overall strategy to reduce dependence on imported oil. Imports were regarded as a threat both to national security and to achieving a favorable balance of international payments. Second, local and State interest in development remained high, and these interests were expressed in Washington, D.C,

In figure 2, projections are shown for the components of the Nation's oil-supply system as they were viewed by the National Petroleum Council in 1971. A similar illustration was used by DO1'S Oil Shale Coordinator in a 1973 decision document that played a continuing role in the Program's justification over the next few years. As shown, domestic oil production in the lower 48 States was predicted to decline steadily from its peak in 1970, and by 1985 to account for less than 50 percent of the oil demand. The drop in production would be compensated for by rising production from the new frontier area on the North Slope of Alaska, but not sufficiently to counter the increasing import dependency. After 1980, total domestic production, including the North Slope, would decline. Oil demand, on the other hand, was predicted to increase steadily and to nearly double between 1970 and 1985. Imports were expected to supply the shortfall, and by 1980 to comprise nearly 50 percent of oil demand. * It was predicted that even with reasonably low world oil prices, the dollar export would have a destabilizing effect on the Nation's economy.

The trend in prices of domestic and imported petroleum from 1968 (the time of Secretary Udall's leasing attempt] to 1974 (the time of the Prototype Program's implementation] is shown in figure 3, In 1968, both

*The estimates of total demand were high but projections of the relative contributions of domestic and foreign sources were generally accurate. Figure 2 predicts a domestic production in 1975 of about 11 million bbl/d, about 60 percent of projected demand. Actual production was only 8.4 million bbl/9. but it *was about 60 percent of actual demand.*

Figure 2.— U.S. Petroleum Supplies as Projected in 1971

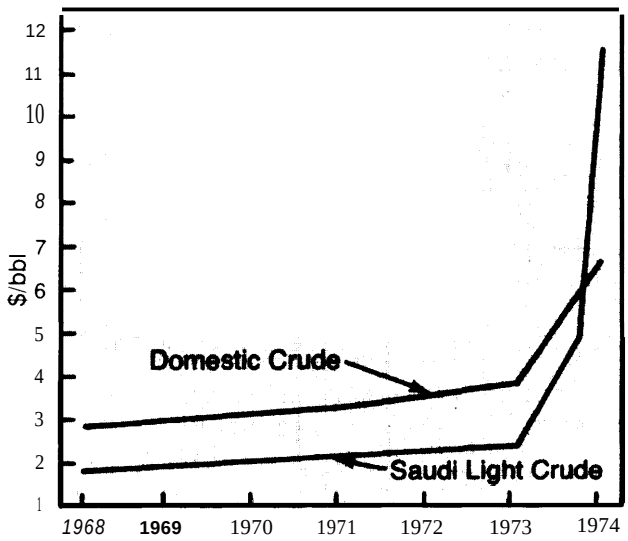


SOURCE U S *Energy Outook An /nitial Appraisal* 7971-1985 The National Petroleum Council July 1971 p 27

supplies were cheap but imports had a modest price advantage that discouraged domestic exploration and high-risk ventures like oil shale development. Beginning with the Teheran pricing agreement of 1971, posted prices of Middle East oil began to rise at a slightly higher rate. The agreement coincided with President Nixon’s request that DOI expedite an oil shale leasing program, In October of 1973, a major military confrontation occurred in the Middle East and the Arab oil embargo followed, directed against the United States and other countries that supported Israel. In November 1973, Secretary Morton called for bids on six oil shale leases under the framework of the Prototype Program.

With the supply shortages caused by the Arab embargo, domestic energy companies concentrated on obtaining any new source of oil, including oil from shale. In evaluating the Prototype Program, the companies certainly anticipated extremely high petroleum prices in the 1980’s when the oil shale plants would come on stream. As discussed in chapter 6 of

Figure 3.— Cost Trends for Domestic and Imported Petroleum



SOURCE Off Ice of Technology Assessment

volume I, under stable conditions when oil supplies are reliable, shale oil has never been able to compete for long with crude petroleum. In late 1973, however, there were indications that the future price for imported oil would be much higher than the expected price for oil from shale. In 1960, for example, Union Oil Co. proposed to market shale oil at about $3.00/bbl, delivered to California.[5] The average price for conventional crude that year was $2.88 /bbl. In 1968, when the average price for crude was $2.94 /bbl, a DOI study indicated that shale oil would have to sell for $3.59/bbl to yield a 12-percent rate of return on investment, DOI also estimated that the price could be reduced to $2.73 /bbl, with improved mining and processing technologies, which would have made it competitive with conventional crude.

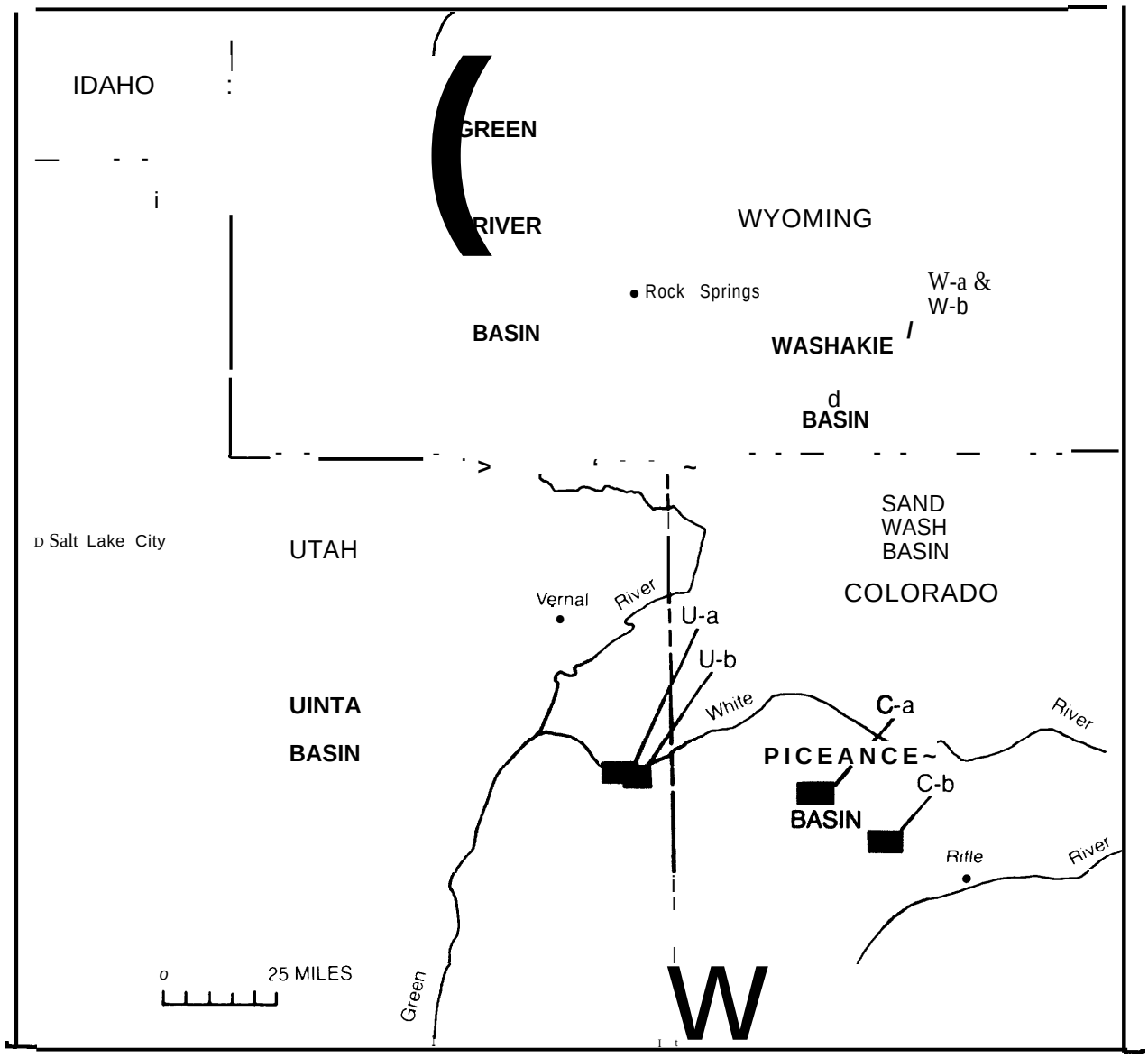
Although shale oil **was** marginally competitive before 1973, it appeared highly attractive after OPEC instituted its new pricing policies. The prevailing opinion among industry's financial analysts was that liquid fuels could be produced from oil shale at a much lower price. Analysts also certainly weighed the favorable provisions of the Prototype leases against the unknown but potentially high costs of environmental protection that would accrue to the successful bidders. They apparently decided that the potential profits to be realized from competition with high-priced foreign oil outweighed the risks associated with investment in oil shale.

The Prototype Program Emerges

In November 1971, DOI requested lease-tract nominations from industry and from the State governments. Twenty tracts were subsequently nominated: thirteen in Colorado, four in Utah, and three in Wyoming, In April of 1972, DOI designated six tracts to be offered for leasing—two in each of the States. (See figure 4.) On April 30, 1973, the final EIS was released.

It is noteworthy that the tracts were dispersed over three States, The reason was partly technical because the sites included four very different resource conditions in terms of oil shale grade and thickness, overburden thickness, and ground water occurrence. It was believed that these diverse conditions would encourage a range of development technologies. DOI suggested in situ processing for the Wyoming tracts; open pit mining for one Colorado tract and wet underground mining for the other; and dry underground mining for both of the Utah tracts. Dispersion of the tracts would also permit an evaluation of socioeconomic effects on three different regions. Impacts would be dispersed over a broader economic base than if all the sites were concentrated in a single demographic area. It is likely that the decision was also influenced by a desire for extensive support by the States.

Figure 4.— Locations of the Tracts Offered for Lease Under the Prototype Program



011 shale deposits of the Green Rwer formation

SOURCE T A sldek Recent Trends in 011 Shale— Part 3 Shale 011 Refing and Some 011 Shale Problems *Minerals Industries Bulletin* VOI 18 No 2 March 1975 p 4

On November 28, 1973, Secretary Morton announced the dates for the sales of leases. In his news release he stated:

> I recognize that estimates for future demand are uncertain, but our best estimates, and the course of recent events affecting our energy supply, leave no doubt that in the years ahead we must place greater reliance on new domestic sources of petroleum. The high risks and many uncertainties that attend dependence on foreign supplies of energy make it imperative that we explore expeditiously all of our promising alternative energy supplies.
>
> The leasing program I have approved will encourage oil shale development and allow

us to learn whether our 600-billion-barrel shale oil reserves can be developed at acceptable economic and environmental costs.

The program's goals were:

- to provide a new energy source to the Nation by stimulating development of commercial oil shale technology by private industry;
- to ensure the environmental integrity of the affected areas and at the same time to develop a full range of environmental safeguards and restoration techniques for incorporation into the planning of a mature oil shale industry, should one develop;
- to permit an equitable return to all parties in the development of the public resource; and
- to develop management expertise in the leasing and supervision of oil shale development as a basis for future administrative procedures.

The terms of the leases were generally favorable to industry participation although in some ways they were more strict than those of the 1968 offering, For example, the lessees would have to spend 2 years characterizing the environmental baseline, including identifying and counting the numerous plants and animal species and measuring air and water quality. They would also have to monitor the environment over the operating lifetime of the processing facilities. The leases were also less generous with respect to timing of the bonus payments with which the leases were purchased. Payments were to be made in five equal installments, one at the time of sale and the others on the subsequent anniversaries of the sale date, In the 1968 offering, bonuses were also to be paid in five installments, but the first payment was not due until the seventh anniversary. In the 1968 program, royalties paid to the Government for the sale of shale oil could be credited against the first bonus payment, if the royalties were paid before the due date of the bonus installment.

The more stringent payment schedule of the Prototype leases was compensated for by other conditions. Among these were the removal of mandatory licensing for any new technologies developed on the lease tracts (a controversial aspect of the 1968 offering), credit against payments for extraordinary environmental protection costs, a diligence incentive that allowed offsetting the fourth and fifth bonus payments by investments made prior to their due dates, and forgiveness of part of the bonus if the lease was relinquished within 3 years. Credits for environmental costs were considered a valid aid in meeting environmental protection requirements that were still evolving. The diligence incentive was to prevent the lessees from withdrawing to a resource-holding position in which little development work was performed. Bonus forgiveness was an escape mechanism by which a lessee could withdraw without sacrificing all of the initial bid.

Overall, the lease terms at least partially compensated for the risks of developing an untested technology under rapidly changing economic and social conditions, and with unknown environmental restrictions. In the context of the energy and oil price situation of the 1973-74 period, the terms were sufficiently attractive to elicit industrial involvement.

Dates for the sale of individual leases were staggered between January 8 and June [11], 1974, to allow firms several opportunities to bid. Sale dates and other details of the Program's initiation are presented in table 1. The winning bids totaled nearly $450 million for slightly over 32 mi^2 (20,500 acres) of surface, The high bid was over $210 million, offered by a joint venture of Gulf Oil Co. and Standard Oil Co. of Indiana.

The development technologies indicated in the table are those suggested by DOI in the EIS and in other documents. They were subsequently adopted by the lessees in their initial detailed development plans. At the time of the lease offering, DOI projected that the six tracts would be producing a total of 250,000 barrels per day by 1980. However, no bids were submitted for the two Wyoming tracts that were proposed for in situ development.

The Wyoming shales are relatively lean and interbedded with barren rock, and their poor quality certainly contributed to the absence of bidder response. Prospective bidders perhaps also lacked confidence in the new and untried in situ approach.

Table 1.–Lease Tracts Offered Under the Prototype Oil Shale Leasing Program

Tract	Location	Date of sale	'Winning bidder	Winning bid	Development concept
C-a	Colorado	1 /8/74	Rio Blanco 011 Shale project {Gulf 011 Standard 011 of Indiana)	$210305,600	Open-pit mining, above-ground retorting
C-b	Colorado	2/12/74	C-b Shale 011 project (Atlantic (Richfield, Tosco Shell, Ashland)	117788,000	Underground mining aboveground retorting ~
U-a[a]	Utah	3/ 12/74	White River Shale 011 Development (Sun 011 Phillips Petroleum)	75,596,800	Underground mining, aboveground retorting
U.b[b]	Utah	4/9/74	White River Shale 011 Corp (Sun 011, Phillips Standard of Ohio)	45 107200	Underground mining aboveground retorting'
W-a	Wyoming	5/ 14/'74	None		In situ (suggested by DOI)
W-b	Wyoming	6/11 174	None		In situ (suggested by DO I)

[a]Ind·ectly heated retorts (e g . TOSCO II
[b]Subsequently unified for common development
[c]Combination of indirectly heated and direct y heating retorts (e g TOSCO II and Paraho or gas combustion)
SOURCE Office of Technology Assessment

Chapter 3 References

'Hearings on oil Shale, Subcommittee on Minerals, Materials, and Fuels of the Senate Committee on Interior and Insular Affairs, 92d Cong., 1st sess., Nov. 15, 1971, Committee Serial 92-12, pp. 33-47.

[2]Ibid.

'Ibid., at pp. 19-25.

'Ibid., at p. 42.

[5]F. L. Hartley (Chairman and President, Union Oil Company of California] and J. M. Hopkins (Acting President of Union's Synthetic Fuels Division), Joint Statement Be-fore the Colorado Interior Legislative Committee *on* Oil Shale, Coal, and Related Minerals, July 23, 1974.

[6]Prospects *for* Oil Shale Development—Colorado, Utah, and Wyoming, Department of the Interior, May **29, 1968.**

[7]"Decision Statement of the Secretary of the Interior on the Prototype Oil Shale Leasing Program, " Department of the Interior, Office of the Secretary, News Release, Nov. 28, 1973.

CHAPTER 4

The Changing Scene Between 1974 and 1979

CHAPTER 4

The Changing Scene Between 1974 and 1979

Introduction

The Prototype Program began in a climate of optimism in 1974 that was soon altered by changing economic conditions, technical and legal problems, and regulatory uncertainties. As a consequence, all of the lessees requested suspensions of operations in 1976, and four of the original industrial participants withdrew. This chapter discusses the problems encountered and their effects on development.

The Changing Economic Situation

In 1974, bidders for the Prototype Program leases assumed that the recent tripling of the world oil prices would make shale oil competitive in the energy marketplace. This assumption was based on preliminary financial estimates completed during the stable economic period that preceded the Arab oil embargo and before detailed studies were performed on specific facilities on specific sites in the oil shale region. As noted in chapter 6 of volume I, subsequent economic estimates were much less favorable, Table 2 shows the upward trend in estimates of investment requirements for shale oil plants, and the trend is further illustrated in figure 5, As shown, between 1973 (the year of the lease offerings) and 1976 (the year of the suspensions requests), estimated costs for an oil shale plant tripled.

Various increments of the cost escalation are attributable to general inflation, to extraordinary cost increases for capital goods, to increased costs of environmental protection, and particularly to the improved accuracy of later, more detailed engineering studies. " Regardless of the reasons, the lessees were alarmed by the sharp reduction in their potential profits, and their distress was exacerbated by problems encountered during predevelopment activities on the lease tracts.

Table 2.–Cost Estimates for Oil Shale Processing Plants

Time of estimate	Estimated costa $ million	Source of estimate	Reference[b]
1968	$138	Department of the Interior	1
1968	144	The Oil Shale Corporation	2
1970	250	The National Petroleum Council	3
1973	280	Department of the Interior	4
1973	250-300	Colony Development Operation	5
Early 1974	400-500	Colony Development Operation	6
Late 1974	850-900	Colony Development Operation	6
1976	960	The Oil Shale Corporation	7
1977	1,050	The Oil Shale Corporation	7

aplanls use underground mining and above-ground retorting Production Capacities are approximately 50,000 bbl/d of shale oil syncrude
bs„ reference list The cost trends are analyzed in references 6and 8

SOURCE Off Ice of Technology Assessment

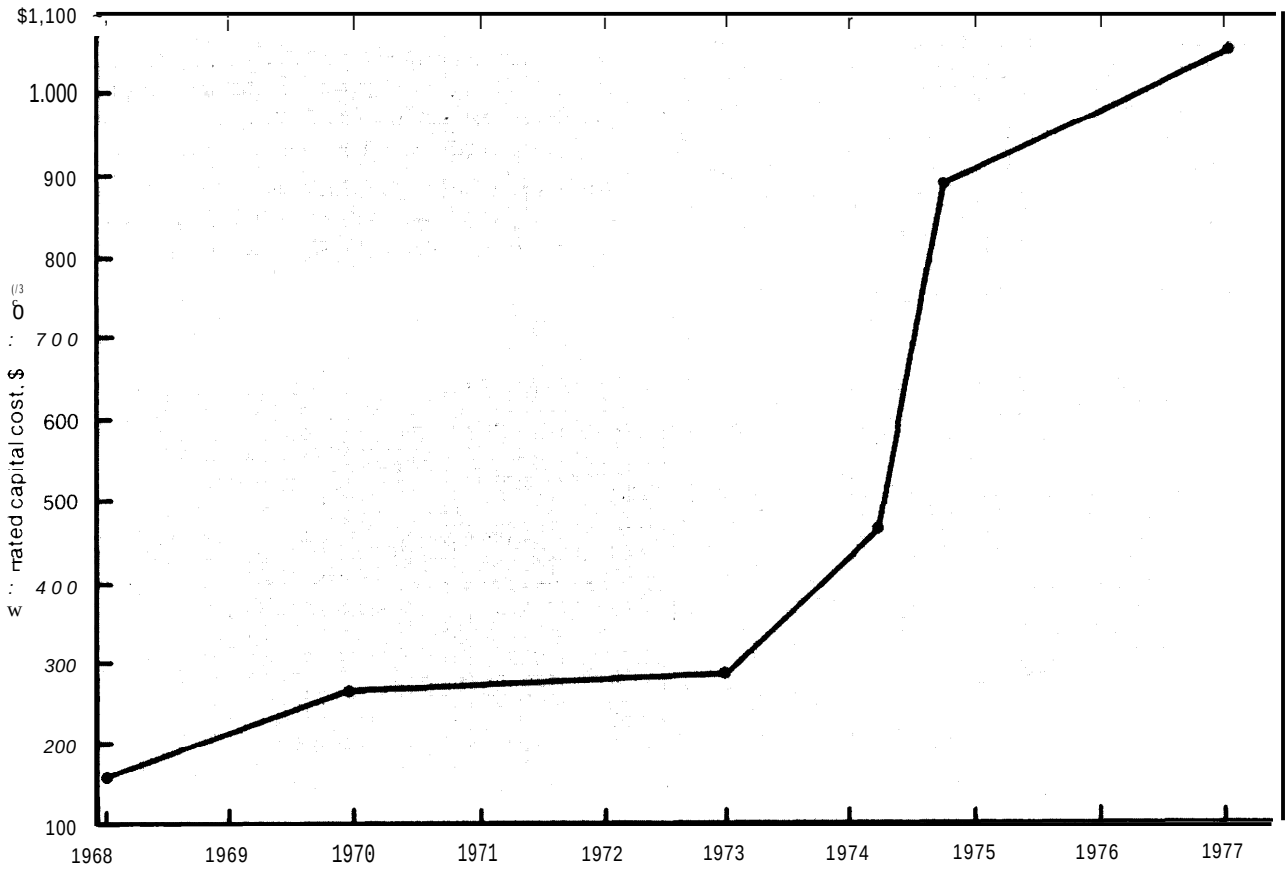
Problems on Colorado Tract C-a

In 1973, the Department of the Interior (DOI) indicated that tract C-a appeared amenable to open pit mining because of the relatively thin overburden covering the oil shale zones, and that aboveground retorting would most likely be employed. Rio Blanco Oil Shale Project, the lessee, incorporated this concept in its initial development plan, which was submitted to the Area Oil Shale Supervisor's Office in March of 1974. Figure 6 is a sketch of the proposed open pit mine design. Rio Blanco's concept for developing the tract is shown in figure 7, Mining would begin in one corner of the tract, and the pit would gradually be enlarged until it encompassed the entire tract surface. After several years, freshly stripped overburden would begin to be returned- to the mined-out area, and the pit would thereafter be backfilled at the same time that new areas were being mined. In the interim, mining and processing wastes would be disposed of on 84 Mesa, a highland to the northeast. * Retorts and other processing facilities would be permanently located on an area adjoining the tract north boundary.

The use of off tract lands for waste disposal and processing sites was a key feature. In evolving the plan, Rio Blanco analyzed alternative development concepts with 'respect to

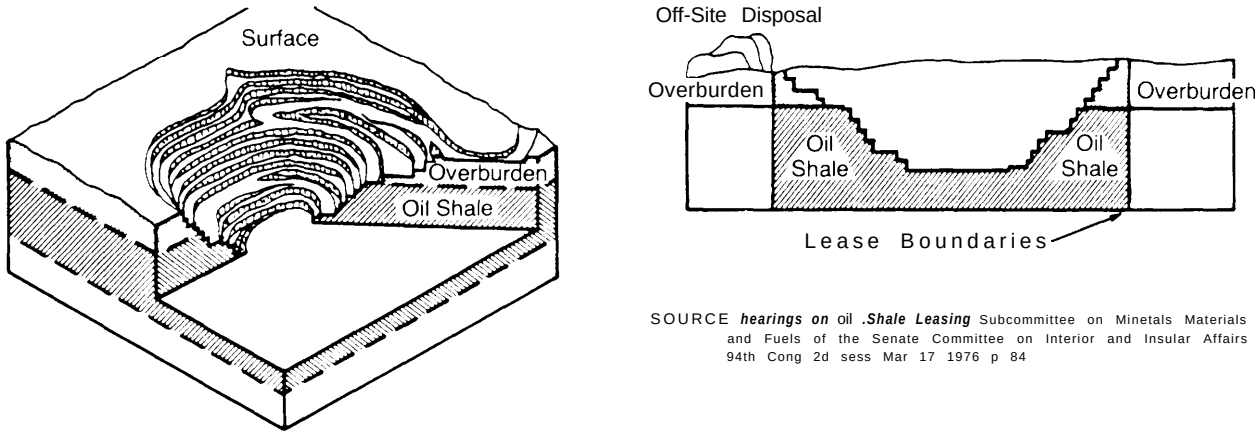
*This specific site was not considered in the environmental impact statement (EIS). The EIS discussed off tract disposal only as a hypothetical possibility not as part of the proposed action.

Figure 5.— Engineering Cost Estimates for 50,000-bbl/d Shale Oil Syncrude Plants



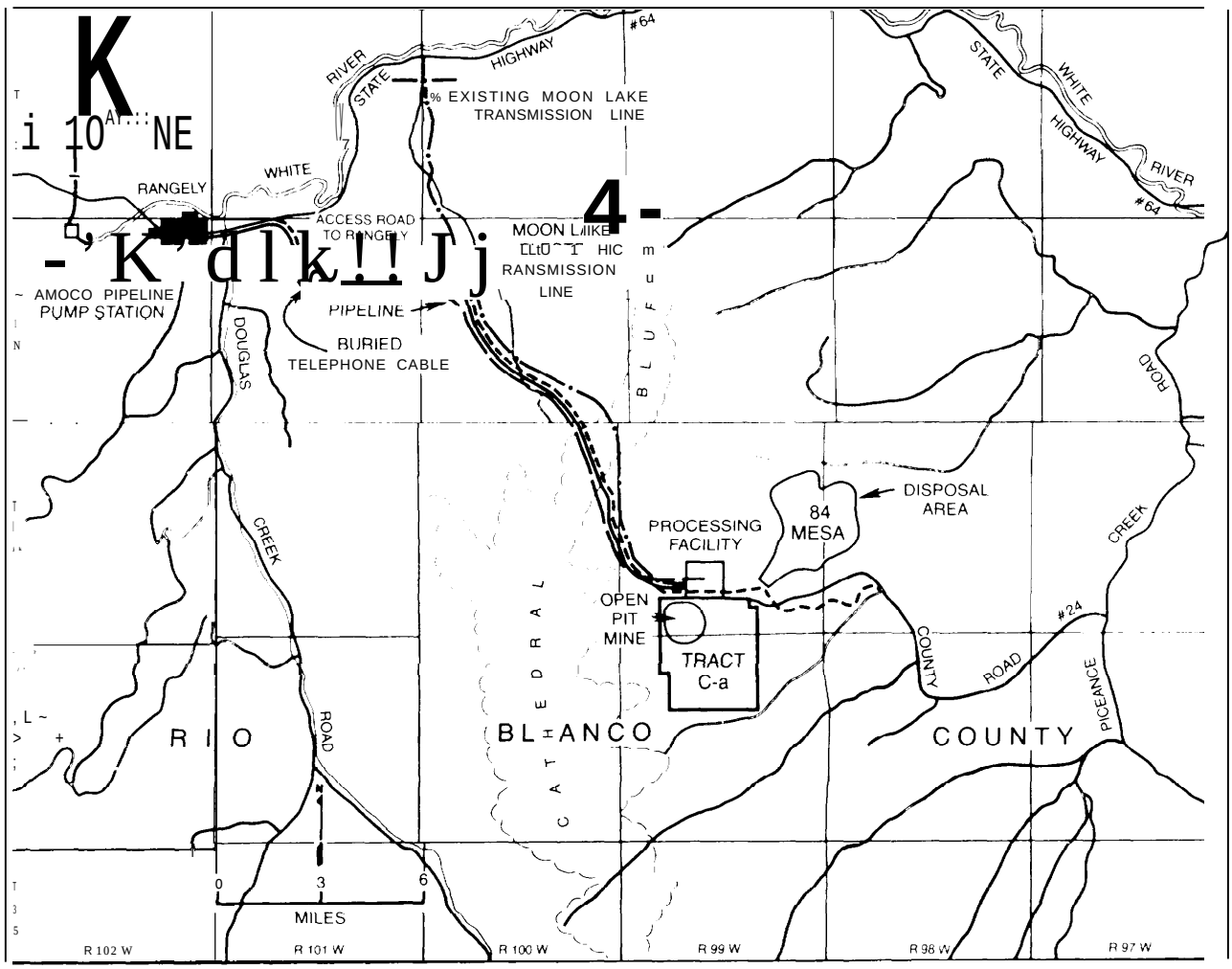
SOURCE Off Ice of Technology Assessment

Figure 6.—Open-Pit Mining Concept Featuring Off tract Waste Disposal



SOURCE *hearings on* oil *.Shale Leasing* Subcommittee on Minetals Materials and Fuels of the Senate Committee on Interior and Insular Affairs 94th Cong 2d sess Mar 17 1976 p 84

Figure 7.— Original Development Plan for Colorado Tract C-a



SOURCE Rio Blanco oil Shale Project Detailed Development *Plan Tract* C-a *Gulf* Oil Corp and Standard Oil Co Indiana March 1976 p 1-3

resource recovery, economics, ease of operation, and overall environmental impact, but rejected them all. [9 10] Underground mining was rejected because resource recovery would be only one-fifth that of a comparable open pit mine. Ontract disposal of solid wastes was rejected because the area covered could not have been mined by open pit without excessive materials handling, Underground mining of the disposal area was rejected because resource recovery would be only one-fourth of that achievable by open pit mining of the entire tract. Finally, several sites within the tract boundaries were considered for the processing facilities but were rejected because of the economic advantages of mining the entire surface.

Rio Blanco had reason to expect that DOI would allow the use of off tract lands. In 1970, DOI'S Solicitor had expressed the opinion that DOI had authority to allow such usage. Furthermore, several references to off tract land use were made in the 1973 EIS. For example, in the volume on specific impacts of oil shale development, it was stated that: [11]

> about 256 million cubic yards of loose waste (overburden) material could be disposed of offsite in Water Gulch which lies to the west of the (C-a) tract.

Two options were also described for disposal of processed shale, both involving off tract disposal areas, " Finally, the EIS noted that:'{

> If this (C-a] tract is mined by surface mining methods, it is expected that the entire surface would be excavated , . .

This would be possible only if the processing facilities were located off tract. Offsite land use was also mentioned in DOI'S advertisement of the lease sales in 1973, as follows:[14]

> The Department recognizes that in some situations lands outside the leased tracts may be required . . . for roads and other purposes . . . Moreover, since this is a prototype rather than a general leasing program, the Department may in the future find it desirable to conduct investigations, studies, and experiments under section 101 of the Public Lands Administration Act (13 U.S.C. 1362), particularly in connection with the disposal of spent shale. In order to facilitate these experiments, the Department is withdrawing from all forms of appropriation under public land laws . . . certain lands in the vicinity of the tracts offered for lease.

The referenced Act allows the Secretary of the Interior to perform work on his own initiative or in cooperation with others involving the improvement, management, use, and protection of the lands and resources under DO1'S jurisdiction. Under this broad authority, and with the concurrence of DO1'S Solicitor, leases were awarded for tracts C-a and C-b on the basis of proposals that included the possible use of off tract lands for waste disposal. In the case of tract C-b, off tract areas were relatively small, involving only about 250 acres. Rio Blanco, however, proposed to use about 6,400 acres of off tract land for development of tract C-a. This was an area larger than the tract itself.

It is apparent from testimony presented by DOI after the leases were awarded that DOI was not fully confident of its powers to award off tract land use. In February 1974, Secretary Morton testified:"

> We have a legal opinion from our solicitor that we would have the authority to grant additional areas if this became necessary. I would like to make sure that we were not on thin ice from a legal point of view , . , Specific authority for the grant of such rights under a general leasing program for oil shale is not apparent. However, the prototype program is of a different nature ., . Particular questions have arisen about the disposal of spent shale. At this time, it is not clearly known what the effect of spent shale disposal piles will be. This matter can only be determined by actual experimentation with and study of disposal sites, This is a very proper type of study to conduct under a prototype program . . . However, the question of granting off lease disposal sites, other than sites used for investigations, studies, and experiments, may arise. Accordingly, the Department has proposed statutory language which would give it full authority to grant offsite tracts if they are needed.

The proposed language was included in two identical bills, S. 1040 and H.R. 5442,

which would have amended the Mineral Leasing Act of 1920. Among the provisions of these bills were a doubling in the size of tracts that could be leased and the granting of secretarial discretion regarding use of off-tract areas. These amendments were important. because the Prototype Program was based on section 21 of the Act, which authorizes the Secretary of the Interior to lease oil shale deposits on public lands "and the surface of so much of the public lands containing such deposits, or land adjacent thereto, as may be required for the extraction and reduction of the leased minerals. "[16] However, the same section provides that no lease may exceed 5,120 acres. No consideration is given to use of off tract areas for waste disposal.

In the opinion of the Comptroller General of the United States, the provisions of the Public Lands Administration Act did allow DOI to use off tract lands for waste disposal in connection with a research and testing program. The provisions were not clear with regard to commercial operations. [17] In the absence of a clear legislative charter, DOI hesitated to allow the lessees to proceed with development plans that depended to a large degree on such strategies. To do so could have been interpreted as a violation of the Mineral Leasing Act,

Many in Congress responded negatively to DOI'S proposed legislation. The statement of Congressman Vanik of Ohio is illustrative of those who opposed it: [18]

> Using (the Public Land Administration Act) as precedent, the Secretary of the Interior will allow mill ions of tons of shale waste to be dumped on adjacent Federal lands that are not leased by the oil compinies under the Pro tot type Leasing Program. This seems to me a very severe stretching o f the apparent intent of (the Act).

Although the language of the bills required that the Government be reimbursed the fair market rental for any off tract land used in support of oil shale leasing,") some members of Congress saw the bill as a giveaway to industry. In any event, the bills did not pass the 93d Congress, and DOI was left without clear authority to allow commercial operations outside of the lease-tract boundaries.

A similar issue had arisen during the construction of the trans-Alaska oil pipeline when DOI had sought to issue a special land use permit for disposal outside the pipeline right-of-way. The action was challenged and, in Wilderness Society v. Morton, the court ruled that—since the Leasing Act provided specific authorization for the basic activity (pipeline rights-of-way)—the Act"s specific limitation could not be ignored by using special land use permits. [20]

The decision was reached in 1973, after the Prototype Program was developed but before the leases were sold. DOI'S Solicitor reviewed the lessees' development proposals in light of the decision and concluded that the ruling also applied to the Prototype Program. On December 20, 1974, Rio Blanco applied for permission to use off tract areas, but early in 1975, DOI denied the application.

This sequence of events was documented in 1976 during hearings on H.R. 11163, a DOI-sponsored bill to amend the Mineral Leasing Act to allow secretarial discretion regarding use of off tract areas by participants in Federal leasing programs. The following exchange took place between Mr. Chris Farrand, Deputy Undersecretary of the Interior, and Congressman Jim Johnson of Colorado:

> Mr. Farrand. We specified in the original environmental impact statement that we anticipated it would be developed by open pit and that the disposal of some of the spent shale would be made offsite.
>
> We also indicated in a withdrawal notice that we published at about the time that the notice of sale was issued that we were withdrawing certain lands around the tract for possible use in experiments with spent shale disposal sites.
>
> Third, in a letter to Senator Jackson in January of 1974, we indicated we had authority to allow offsite disposal or to make lands available for such disposal through an existing program we call the special land-use permitsystem.

> Unfortunately, partially as a result of the decision in the trans-Alaskan pipeline case and as a result of a review by our Solicitor's office, we found we did not have the authority to grant off site disposal. For that reason, we have come back to Congress to ask for an amendment to the Mineral Leasing Act to allow us to utilize lands in the vicinity of oil shale leases and make them available to the lessees only for very specified purposes attendant to the development of an oil shale lease itself.
>
> **Mr. Johnson.** But it was originally your intention and understanding that you had this authority at the time you entered into the contract for C-a, the lease contract, and both parties understood this was the case?
>
> **Mr. Farrand.** There was apparently some disagreement within the Department but we conveyed to the public and perhaps to the lessees themselves that we had the authority. It was our mistake because we did not have that authority. This is the best I can say. It was an error, *

The bill was designed to allocate an additional 6,400 acres of Federal land for use in development of the lease tracts. About 4,100 acres would have been used for 84 Mesa disposal area, The off tract processing facilities would have occupied an additional 1,500 acres, and the balance would have been used as waste transportation corridors and for other purposes. DOI's position was that the additional land would allow Rio Blanco to maximize resource recovery without reducing access to oil shale resources on the offtract areas. Mr. Farrand noted in his testimony that open pit mining would allow recovery of 5 billion bbl of shale oil. If underground mining had to be substituted because of the ban on use of offtract areas, only about 1 billion bbl could be recovered.

This position was disputed by a U.S. Geological Survey analyst who maintained that the 84 Mesa site contained more oil shale than did tract C-a, although at greater depths. He expressed concern that waste disposal on the mesa would preclude future development of its resources by open pit mining, and that roughly $10 billion in mineral values would be lost to the public as a result.[22] DOI argued that the overburden on the mesa was too thick for open pit mining, and that resource recovery by underground mining would be reduced only about 5 percent by the additional weight of waste materials from tract C-a.[23]

Congress rejected the bill. The kinds of opposition it faced were summed up in the testimony of Senator Haskell of Colorado,[24] He noted, first, that the Mineral Leasing Act seemed clear in denying authority for off tract disposal. Second, he called attention to the original C-a detailed development plan (DDP) that indicated the tract could accommodate open-pit mining with ontract disposal while producing 50,000 bbl/d for 30 years, Finally, he expressed a concern that DOI was attempting to promote oil shale beyond the levels initially contemplated for the Prototype Program.

The latter concern was also expressed by Representative Schroeder of Colorado in connection with her bill to prohibit dumping of spent oil shale on any Federal lands not specifically included under the Prototype leases. Her testimony on the bill includes the following statement:[25]

> . . . I strongly believe that oil shale development carried forth under the supervision of the Federal Government should proceed at a pace which permits careful and complete evaluation of its impacts, I believe we will only have such evaluations if development is carried forth according to the schedule of such programs as the Department of the Interior's Prototype Oil Shale Leasing Programs in Colorado and Utah . . . Any more efforts than this become the sort of crash program for which the Federal Government is famous
>
> I think everyone who bid on these Colorado tracts thought it would be enough land to carry on the prototype programs the leasing program envisioned,

The sentiments expressed in connection with amendments to the Mineral Leasing Act

*Environmental protection groups had questioned off tract disposal as early as 1972 in comments on the draft EIS. They met with the Colorado Director of BLM in December 1973, before the lease sales. to protest. DOI should have been well aware of the opposition.

continued to prevail. The Federal Land Policy and Management Act of 1976 includes the following:

> Nothing in this Act, or in any amendments made by this Act, shall be construed as permitting any person to place, or allow to be placed, spent oil shale, overburden, or by-products from the recovery of other minerals found with oil shale, on any Federal land other than Federal land which has been leased for the recovery of shale oil . . . [26]

Rio Blanco encountered other problems on tract C-a when environmental monitoring programs measured high background levels of hydrocarbon emissions, apparently from sagebrush and other vegetation, that might have precluded any significant development under certain interpretations of air quality regulations. This problem, although unusual, illustrates the problems cited by the tract lessees with respect to regulatory uncertainties. Because of its importance and because similar circumstances were encountered on the other lease tracts, the problem of high background emissions is discussed in a separate part of this chapter.

The legal, political, and environmental problems encountered on tract C-a, when coupled with the uncertain economic feasibility of oil shale development, led to Rio Blanco's request for a suspension of lease terms in July of 1976, Details of the request are discussed later.

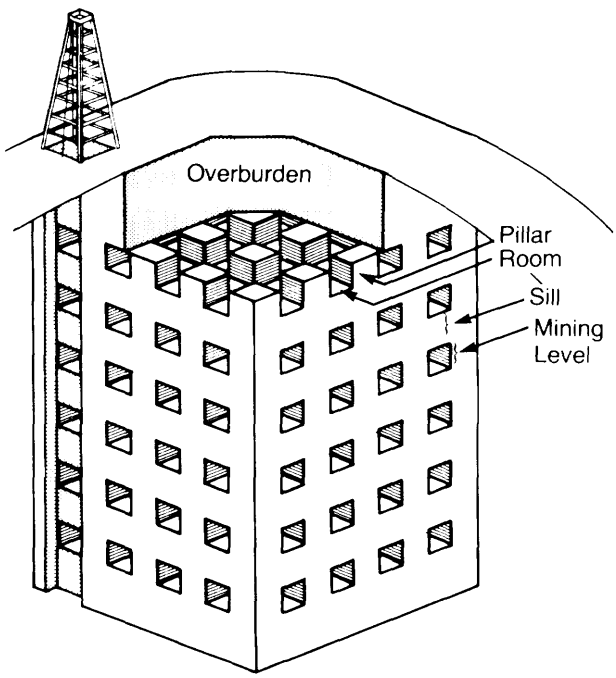
Problems on Colorado Tract C-b

In the original development plan, tract C-b was to be developed by underground room-and-pillar mining in conjunction with above--ground retorting. During predevelopment studies on the tract, the lessees encountered problems with the geological characteristics of the oil shale deposits, which made the project unattractive economically and forced evaluation of other options.

Multilevel room-and-pillar mining is depicted in figure 8. Mining begins by providing access to the oil shale zone through a vertical shaft from the surface or a horizontal drift through an adjacent outcrop. Large rooms are blasted into the mining zone, and broken shale is removed to the surface for processing, Some unbroken shale is left in place to prevent the roof from falling. Mining can be conducted on several levels if a floor or "sill pillar"' of unbroken shale is left between adjacent levels. Oil shale forms the support matrix for the entire mine. Except for roof bolts and grout no other structural materials are usually required.

The great thickness of the Green River formation deposits are very favorable for room-and-pillar mining because large underground

Figure 8.—A Multiple-Level Room. and-Pillar Oil Shale Mine



SOURCE ***Hear/rig on 01/ Shale Leas/rig*** Subcommittee on Minerals Materials and Fuels of the he Senate Commitee on Interior and Insular Affairs 94th Cong 2d sess Mar 17 1976 p 8 3

equipment can be used, with resulting high production rates and low costs. The economic feasibility is sensitive to the mechanical properties of the oil shale, because they determine the amount of shale in the support pillars. The stronger the shale, the smaller the pillars and the higher the resource recovery. Shale that is weak because of natural fractures will require large pillars. Under these conditions, resource recovery would be low, and mining costs very high.

Preliminary studies indicated that the shale on tract C-b was strong. However, later tests showed that much of the shale in the mining zone was badly fractured, and that support pillars would have to be larger than anticipated. Resource recovery would have been unacceptably low. Because the venture's economic feasibility depended on high resource recovery, the lessees determined that the original development concept could not be pursued,

As on tract C-a, the C-b lessees also measured high background levels of air pollutants. These problems were further compounded by the unfavorable project cost estimates that were revealed late in 1974, Tosco and Atlantic Richfield began to reconsider their commitment to the leasing program, and on December 29, 1975, they assigned their interests to Ashland and Shell, withdrew from the tract, and forfeited their investments in the lease. The reasons cited for the withdrawal were inflation, questionable economic feasibility, and lack of governmental support in clarifying the effects of the background emissions on future tract development.

Ashland and Shell were left with the task of revising the development plan for the tract. They were unable to do so with confidence within the time constraints imposed by the lease terms, and in March of **1976,** they requested a suspension of operations. The request is discussed later in this chapter.

Problems on the Utah Tracts

Relatively few technical surprises were encountered on tracts U-a and U-b, but the baseline monitoring programs also measured levels of naturally occurring pollutants that occasionally exceeded ambient air quality standards. The Utah lessees were further affected by legal battles between the Federal Government, the State of Utah, and private firms over ownership of lands encompassing the tracts.

In-Lieu Lands

Ownership rights are clouded over much of the oil shale area, but the situation in Utah is particularly complicated by circumstances associated with the granting of Utah's statehood. Under the Statehood Enabling Act of 1894, Utah was allowed to take title to four sections of land in each township, with the intent that proceeds from the sale or use of these sections would be applied to public education. At that time, much of Utah was unsettled and unsurveyed, and boundaries of many townships could not be located. Consequently, the Federal Government allowed the State to delay transfer of these sections until surveys could be completed, Subsequently, the Government appropriated entire townships for parks, monuments, national forests, and Indian reservations, These lands were removed from possible acquisition by the State. In lieu of these lands, Utah was allowed to select other areas in other townships. The in-lieu lands could be arranged in contiguous parcels, whereas the four sections originally granted by the Statehood Act were noncontiguous.

The Statehood Act allowed transfer of Federal land to the State only if the land contained no valuable minerals, In 1918, Utah sued for an exemption to this rule, but lost.[27] In 1927, Congress changed the law to allow selection of mineral lands under the statehood grants, but in-lieu lands were still re-

quired to be nonmineral in nature.'}' In 1958, the law was changed again to allow selection of mineral-bearing in-lieu lands provided that the corresponding statehood-grant sections also contained minerals, [29] In 1960, another change allowed selection of any unappropriated public lands regardless of their mineral character. Specifically included were the oil shale lands withdrawn by President Hoover's Executive Order 5327.

By 1960, Utah's stockpile of in-lieu lands had reached 562,000 acres; this was subsequently reduced to 225,000 acres through the selection process. * In February 1963, Secretary of the Interior Udall, at the request of Colorado Representative Aspinall, instructed the Bureau of Land Management (BLM) to postpone transfer of additional mineral-bearing land until Congress could consider the ramifications of the 1960 amendment. Mr. Aspinall introduced a bill that would have prevented the States from selecting in-lieu lands with much greater value than the statehood sections, but the bill did not pass. In 1965 BLM announced that it was prepared to resume its review of in-lieu applications, [30] However, in January 1967, Secretary Udall told the Utah government that DOI would not transfer in-lieu lands of disparate value, citing as authority for this position the provisions of the Taylor Grazing Act. Nevertheless, Utah continued to apply for in-lieu selections and between September 1965 and November 1971 submitted 10 separate applications for transfer of 194 parcels of land totaling 157,225.9 acres, The land was located in the oil shale area of the Uinta basin and included the present sites of lease tracts U-a and U-b,

Interior delayed action on these applications and initiated an EIS specifically directed to the transfer of the Utah lands. The rationale was that the transfer would give a substantial block of oil shale land to a State desirous of creating an oil shale industry that could have significant environmental consequences. The statement had not been completed as of March 1974 when the Utah tracts were leased, [32]

Between January 8 and February 12, 1974, leases to tracts C-a and C-b were sold for a total of nearly $330 million—about $33,000 per acre. If the lands requested by Utah were regarded as having equivalent market value, their transfer would have meant a loss of over $5 billion in mineral values to the U.S. Treasury. Secretary Morton wished to avoid or at least reduce this loss. on February 14, 1974, he notified Utah's Governor Rampton that DOI would not exchange the in-lieu lands on an acre-for-acre basis but would rather exchange lands of equal monetary value to the statehood grant sections, thereby following the precedent set by Secretary Udall in 1967, [33]

On February 26, Senator Moss of Utah complained about Secretary Morton's position as follows:[34]

> The Secretary knows that his position is not legally sound. He is afraid, however, of the political repercussions, the unfounded charges of "giveaway'< which will be hurled at him, if he does what the law requires and approves the selection lists. Therefore, tomorrow the State will file suit for declaratory and injunctive relief, seeking what has been its due for **80** years . . . Since December of 1973, I have been considering filing suit as best friend of the thousands of school children in Utah who are and have been denied rights granted to them by the Congress many years ago . . . Now, however, since the State is taking affirmative steps to bring suit, we have determined to support . . . its efforts . . . I cannot sit idly by and allow the Secretary of the Interior to delay, procrastinate and obfuscate a matter which is clear on its face. The statute in question . . . states clearly that selections for lands lost shall be based on equal acreage. The statute does not require equal value, To apply a new rule by administrative fiat is unconscionable, arbitrary, and capricious.

*other Western States were also granted school indemnity lands. At present the States are entitled to the following acreages: Arizona California-180.000: Colorado Idaho

On March 4 1974, Utah filed suit against Secretary Morton in the U.S. District Court in Salt Lake City, seeking an order to compel him to rule on the in-lieu requests without reference to the value of the parcels involved. In 1976, the court ruled that the Secretary was to determine if the applications complied with the requirements of the law allowing transfer of mineral lands, and to refrain from comparing the value of the lands requested to the sections granted at the time of statehood." The court further concluded that the National Environmental Policy Act was not applicable and that an environmental statement was not required. (DOI'S EIS was subsequently abandoned.) On September 14, 1976, DOI appealed the ruling to the 10th District Court of Appeals in Denver, where the case remained until August 1978 when the earlier decision was upheld. [b]

Tracts U-a and U-b were leased on June 1, 1974, during the court contest in Salt Lake City. The lessees were not overly disturbed by the conflict, because Governor Rampton and Secretary Morton had agreed that the lease terms would remain in effect regardless of the court's ruling. The agreement was signed before the leases were sold. Under the direction of the court, proceeds from the lease sales (some $78 million as of May 1976) were invested in treasury bonds with the proceeds to go to the winner of the litigation,

On May 19, 1980, the U.S. Supreme Court reversed the decision of the Circuit Court. [37] It upheld the Secretary of the Interior's decision to refuse Utah's applications for State indemnity selections of public lands that were grossly disparate in value to the original school land sections. The Court held that under section 7 of the Taylor Grazing Act, which requires the Secretary to classify public lands within Federal grazing districts as proper for school indemnity selections, the Secretary is vested with broad discretion in establishing criteria for classification; and that the "grossly disparate value standard" used in rejecting Utah's selection was a valid exercise of that discretion. The Court found that the Secretary's action was wholly faithful to Congress' consistent purpose, in providing for indemnity selections, of giving the States the rough equivalent of the school land grant sections that were lost through preemption or private entry before they were surveyed.

Other problems, relating to the existence of unpatented mining claims overlying the Utah tracts, and an application for a State lease to develop the same areas, also existed in Utah.

Unpatented Mining Claims

Before enactment of the Mineral Leasing Act in 1920, oil shale was subject to disposition under the oil placer provisions of the mining laws. No new oil shale claims could be located after enactment of the Leasing Act; however, section 37 contained a savings clause which preserved "valid claims existent at date of the passage of this Act and thereafter maintained in compliance with the (mining) laws under which initiated, which claims may be perfected under such laws, including discovery. " [38]

The savings clause allows those who had properly located claims to perfect them by continuing operations to satisfy the requirements for a patent. Under the oil placer provisions, claims had to be located in tracts of no more than 20 acres per individual and no more than 160 acres per association of claimants. In practice, almost all of them before 1920 were located as 160-acre association placer claims. The law requires that each claim be individually "located" (staked and marked), that there be an actual "discovery" (exposure) of a "valuable mineral deposit, " within the limits of each claim, and that the land be "chiefly valuable" for the oil shale deposit.

Claims continue indefinitely with or without mineral production, The Mining Law requires that at least $100 worth of assessment (development) work be performed each year until each claim is patented, although work can be combined for contiguous claims in common ownership, and done on only one or

some of them, if it benefits all the claims. If the annual assessment work is not performed on or for the benefit of a claim during any year, the claim can be relocated by the original claimants, or by others as long as this takes place before the original locators have resumed work. Complete title to the surface and subsurface of a placer claim can be obtained by submitting an application for a patent, performing at least $500 worth of assessment work, and paying a fee of $2.50/acre plus any survey costs. The right to mine and make use of the surface exists whether or not the claim is patented, but, prior to isssuance of a patent, surface use is limited to that required for the claimant's mineral operations. After issuance of a patent, the owner can do whatever he wants with the land. On either patented or unpatented claims, there is no requirement that mineral production ever be commenced, nor any requirements related to the timing, method, or pattern of development.

The validity of pre-1920) oil shale mining claims has been the subject of considerable dispute for many years, The dispute centers on the meaning of the valuable mineral deposit criterion as applied to oil shale and the consequences of failure to perform assessment work prior to 1971. The uncertain status of pre-1920 claims blanketing the prototype oil shale leases in Utah was one of the principal bases for the court-ordered suspension of activities, granted at the request of the lessees.

In the late 1960's, DOI began a legal campaign to resolve the ownership issue. By 1974 all of the disputed titles in Wyoming and half of those in Colorado had been cleared in favor of the Government: none of the Utah titles had been cleared, including the claims on tracts U-a and U-b, "

At the time of the lease offerings it appeared that the Utah claims would be settled in the Government's favor and industrial bidders were apparently relying on this outcome. In 1971, DOI Solicitor Melich ruled that DOI had authority to sell the leases, even though the tracts were covered with unpatented mining claims, if revenues were held in reserve pending the outcome of litigation. If the Government won, the revenues would be handled the same as with the other tracts, and the State of Utah would receive its percentage share as provided by the Mineral Leasing Act. If the courts ruled in favor of the holders of the unpatented claims, then the claimants would divide the money. [40] However, all Federal and State leases would be declared void. This procedure, which assumed agreement by the mining claimants (and hence no cancellation of leases) was not, in fact, implemented.

Despite the uncertainties—the lessees could not rely on permission to proceed with tracts could be lost—the White River Shale Project purchased the leases and proceeded with development. Evidently, the participants were confident that the Government would ultimately prevail, or that they would be able to negotiate acceptable terms with the private claimants, if they prevailed. On June 1, 1974, leases were issued for the Utah tracts.

This confidence may have been related to DOI"S aggressive program to invalidate the outstanding mining claims. On November 19, 1973, BLM initiated four contest proceedings against certain claims in Colorado, seeking to invalidate them on the theory that a mining claim could be valid only if the deposit could have been developed, extracted, and marketed at a reasonable profit at the time of location, and if the marketability had continued without substantial interruption from the date of location to the time of the contest proceedings. In 1970, BLM succeeded in invalidating three of the oil shale claims on other grounds, but the DOI hearing officer validated six claims belonging to Shell Oil Co. and others, rejecting BLM's marketability theory. BLM filed an appeal brief in 1970 seeking invalidation of the remaining six claims.

On June 28, 1974, the DOI Board of Land Appeals reversed the hearing officer, accepted BLM's marketability theory, and in-

validated all of the claims. The issue was not soon settled because on August [20], Shell Oil Co. filed a complaint in the District Court in Denver seeking a reversal of the Board's ruling.

In 1976, the District Court reversed the Board's decision and ruled that the claims at issue were valid.[41] The court held that DOI was bound by prior departmental precedent in the 1927 case of Freeman v. Summers [42] which recognized that oil shale was a valuable mineral subject to appropriation under the mining laws and that established the legal basis in patenting pre-1920 claims for more than 30 years of Department practice. The court said that by not requiring any showing of present marketability for oil shale claims, the Freeman case established a separate and more liberal valuable mineral test than that applied to other locatable minerals, The court reasoned that, since Congress had twice considered the issue of oil shale patentability and had implicitly "ratified" the Freeman decision by not reversing it legislatively, and since investors had relied upon the Freeman rule for over half a century, DOI was not permitted to adopt the present marketability test as a new standard for evaluating the pre-1920 claims.

The Freeman case arose from a protest filed in 1923 by pre-1920 mining claimants against homestead entries made by Summers in 1920. The shale claims had been located on the same land in 1918. If the claims were valid at the time of the homestead entries and continued to be valid at the time the protest was filed, the claimants had a prior right to obtain patents for both the surface and the subsurface, and the homestead entries would have to be canceled. There could be no dispute concerning the basic mineral nature of the land, since it had been classified as mineral in character in 1916. However, the mining claimants, in order to establish the initial and continuing validity of their claims, had to show that they had discovered a valuable mineral deposit on each claim, that the land was chiefly valuable for such deposit, and that they had performed the required annual assessment work.

The initial decision, in 1924, by DOI'S local register and receiver, found that the claims were invalid because oil shale deposits of sufficient value to be marketable had not been exposed and the required assessment work had not been performed. The commissioner of the land office reversed this initial decision, citing evidence that had been submitted which purported to show that rich lower strata could be profitably worked, and concluding, without any discussion, that there had been a discovery of the valuable strata. At the end of 1924, DOI'S First Assistant Secretary Finney reversed the commissioner's decision and declared the claims null and void, finding there had been no proof of sufficient assessment work and that there was no probative evidence demonstrating that the lower, unexposed beds were valuable for mining purposes.

Finney's decision was the final appeal available as a matter of right. Two requests for rehearing or retrial were denied. Considerable pressure, however, was brought to bear on DOI by oil shale mining claimants from Colorado and their representatives in Congress. The Secretary of the Interior exercised his supervisory power to order the case reopened and retried, and held an open meeting attended only by oil shale mining claimants and their supporters at which the issue of discovery of the richer lower strata through geologic inference rather than actual exposure was extensively discussed. In 1927, Finney wrote and the Secretary signed a new and final decision upholding the mining claimants" protest, a decision with which neither DOI'S Solicitor nor any of his attorneys agreed. 43

The decision was mainly concerned with the issue that had been the primary focus throughout the proceedings: the extent to which geologic inference could be used to support a discovery of the richer lower strata, However, it also addressed the value issue:

> While at the present time there has been no considerable production of oil from shales, due to the fact that abundant quantities of oil have been produced more cheapl$_y$

from wells, there is no possible doubt of its value and of the fact that it constitutes an enormously valuable resource for future use by the American people,

It is not necessary, in order to constitute a valid discovery under the general mining laws sufficient to support an application for patent, that the mineral in its present situation can be immediately disposed of a t a profit . . . [44]

DOI appealed the 1976 District Court decision. The Tenth Circuit Court of Appeals affirmed the lower court decision and held that the Department was bound by the Freeman precedent. [45] The U.S. Supreme Court agreed to review, on June 2, 1980 the Supreme Court issued its opinion affirming the decisions of the lower court that oil shale was a valuable mineral and rejecting the application of the present marketability standard. The case, Andrus v. Shell Oil CO., [46] held that oil shale is a valuable mineral that is patentable under the savings clause of the Mineral Leasing Act of 1920. In its decision the Court noted that before 1920 there had been uncertainty about whether oil shale was patentable under the mining laws since there was no commercial production of shale oil. The Court found that by enacting the Mineral Leasing Act of 1920 that withdrew oil shale from disposition under the mining law, Congress at least implicitly recognized that oil shale had been locatable. Since oil shale was not then commercially valuable, the Court reasoned that Congress must not have intended any consideration of the present profitability of shale in determining whether a claim was patentable. To support its conclusion, the Court cited the Freeman decision and departmental practices over 33 years in issuing more than 523 patents as evidence of the contemporaneous administrative construction of the 1920 Act by those charged with its implemen tat ion.

In a footnote. the Court recognized that a separate value test exists for oil shale:

(The) history indicates only that a present marketability standard does not apply to oil shale. It does not affect our conclusion in United States v. Coleman that for other minerals the Interior Department's profitability test is a permissible interpretation of the ''valuable mineral requirement. [47]

The implications of this Supreme Court decision for the unpatented claims in Utah are not yet clear.

The Peninsula Mining Case

A further complication arose in 1974 when Peninsula Mining, Inc., a Utah firm, applied for State leases for 46,000 acres of land in the Uinta basin, including tracts U-a and U-b. Peninsula contended the Utah legal code required that the State must lease land, where available, to the first qualified applicant to satisfy the appropriate filing procedures, which Peninsula Mining did on June 21, 1974. Utah rejected the lease applications.

On December 11, 1974, Peninsula sued the State of Utah in the Third Judicial District Court of Salt Lake County, pleading that Utah had complied with applicable laws, that title should have been granted by the Federal Government within a reasonable time, and that the State was therefore entitled and obligated to issue a lease for the area. On March 5, 1975, proceedings were stayed pending resolution of Peninsula's petition to intervene in the Utah indemnity selection case. The petition was subsequently denied, Utah's motion to vacate the stay order and to dismiss the complaint was also denied by the State court, and the stay is still in effect .[48]

In 1976, therefore, the lessees of tracts U-a and U-b were uncertain of the ultimate identity of their landlord. Depending on court decisions in a number of lawsuits, the landlord could be the Federal Government, the State of Utah, or one of a number of private parties. The uncertainty remains in light of the Supreme Court decision in Andrus v. Shell Oil co.

Environmental Problems

The Utah lessees also encountered high backround levels of naturally occurring air pollutants during their environmental moni-

toring programs. The emissions were like those found in Colorado and may have been similarly related to natural sources. Because of the ownership conflict and because the regulations promulgated under the Clean Air Act might prohibit further industrial development, the lessees applied to DOI for a suspension of lease provisions on July 19, 1976.[49]

Problems With the Environmental Baseline

Under the provisions of the leases, the lessees were required to monitor air and water quality, as well as other environmental characteristics on the tracts and their environs. The purpose was to compile a body of data that would define the baseline conditions before development. Any changes after development started could then be associated with the related activities. The monitoring programs were to cover a Z-year period. Early in the programs, air quality measurements detected concentrations of particulate, hydrocarbons, and ozone that occasionally exceeded the National Ambient Air Quality Standards (NAAQS) that were promulgated under the Clean Air Act of 1970. * This situation was regarded as serious at the time because the Act prohibited additional industrial development in areas of excessive air pollution, i.e., areas where pollutant concentrations exceeded any of the NAAQS.

The discovery was surprising because there is very little industry near the tracts. It was subsequently hypothesized that the pollutants might be emitted by natural sources within the oil shale areas or by industries and municipalities outside of the region. Particulate were related to windblown dust; hydrocarbons to emissions from nearby gasfields or more likely from sagebrush and other vegetation; and ozone to long-distance air transport from the Salt Lake City airshed.[50,51]

The leases prohibited further development until the pollution problem was solved, or until the NAAQS were modified, A DOI official described the situation as follows:[52]

> When we discovered this to be a problem we immediately contacted the Environmental Protection Agency, asked them whether in fact the situation had to be resolved legislatively or whether it could be resolved administratively. The answer the Secretary received from Administrator Train was that they believed that in July an amendment then pending before the Congress would solve the problem, but barring that they thought they could deal with it administratively and were in fact undertaking some studies to determine whether a change in the standards or a change in the approach to the ambient air quality problems might be appropriate.
>
> I have received a draft, internal copy, of their study, which indicates that when they set the (standards) they did not understand all the interrelationships between hydrocarbons and oxides, and in fact they may have to adjust the geographical boundaries for which they set ambient air quality standards.
>
> If they do, it might resolve the problem, Without administration or legislative help, however, I remind you that the situation presents an absolute impediment; that there can be no legal action to develop those leases under the conditions that appear to exist at this point.

The area of uncertainty in the standards relates to the reactions between hydrocarbons and nitrogen oxides (both of which are regulated) to form ozone. It was not clear that high hydrocarbon concentrations would necessarily constitute a health hazard in the oil shale area where concentrations of nitrogen oxides were very low.[53] What was clear was that the tracts could not be developed under the law as then interpreted.

*The laws and standards that regulate air quality in the oil shale region are discussed in ch. 8 of vol. 1.

The Political Climate

During the mid-1970's, it was generally recognized that achieving energy independence would require the cooperation of domestic oil producers, at least in the near term, However, there were growing concerns about the high profits that oil companies had made during the Arab oil embargo, Government subsidies for fossil fuel production, environmental impacts of energy development, and the costs of extracting fuels from oil shale, Pressures mounted to divest the integrated operations of the major oil companies as a means for increasing competition in the energy industry.

Perhaps it was these concerns that prompted Congress to reject several pieces of legislation that would have supported synthetic fuel production in general, and benefited oil shale developers in particular. As mentioned previously, Congress did not pass the bill that would have allowed Rio Blanco to use off tract lands, but instead adopted the language of FLPMA. In 1975, President Ford proposed an Energy Independence Authority that would have provided as much as $100 billion for developing new energy sources. The proposal was not approved by Congress,

Also in 1975, the House of Representatives struck a $6 billion loan-guarantee provision from the authorization bill for the Energy Research and Development Administration (ERDA). * The provision was strongly supported by the participants in the Prototype Program, Had it passed, it could have removed some, although not all, of the financial uncertainty of oil shale development. The House also rejected a Senate bill that would have allowed use of public land for research on in situ processing. In 1976, a bill was introduced to authorize $3.5 billion in loan guarantees and $500 million in price supports for synthetic fuels. The bill was defeated in committee. When coupled with the economic, geotechnical, environmental, and legal problems, the political climate led all of the lessees to reconsider continued involvement in the leasing program.

*The Department of Energy (DOE), ERDA's successor, now has generic loan guarantee authority, but has not applied it to oil shale.

Suspension Requests

By the end of 1975, the original development concepts for tracts C-a and C-b had been invalidated. On tract C-b, management was disrupted by the withdrawal of two of the original partners. In Utah, the lessees had no assurance that the development of the tracts could proceed at all, but the lessees were sure that resolving the ownership issues would require months, or even years. For all of the tracts, obtaining the necessary legislative or administrative solutions to the air quality problem promised to be a lengthy process. All of these uncertainties introduced the strong possibility of significant delays in the development schedules.

Potential delays were of considerable economic concern to the lessees. The lease terms required full payment of the first three bonus payments but the fourth and fifth could be partially or even fully offset by investments in tract development. In order to qualify for the benefits of the offset provision, investments had to be made prior to the fourth and fifth anniversaries of the lease sales. That is, at least one-fifth of the original bonus bid (plus interest) had to have been spent on the tract before the fourth anniversary and an additional one-fifth before the fifth anniversary. If no work were done, the total amount of the bonus bid would have to be paid to the Government, Therefore, any delays that lowered the amounts of investment in the fourth and fifth years reduced the financial attractiveness of the projects. Many millions of dollars would be lost by each of the participants if in-

vestments were not made according to original schedules.

The lessees saw only three possibilities:

. to relinquish the leases,
. to expedite preparation of new development plans and to press for resolution of legal and regulatory uncertainties, or
• to request suspension of lease requirements until the uncertainties could be resolved.

The first choice would have entailed the sacrifice of three-fifths of the bonus bids for a total financial loss of over $270 million (see table I) if all participants withdrew. The Prototype Program would have ended, and its termination would have eliminated a commercialization opportunity that was still attractive to industry. The second alternative would have involved much risk, even if only technical crash programs were required that were completely controlled by the companies. These risks were magnified by the necessity of involvement with the courts and the regulatory agencies. The third possibility was allowed by the provisions of the Mineral Leasing Act of 1920, as amended, but only for the purposes of encouraging the greatest ultimate recovery of the mineral. [54]

The lessee's concerns may have been related to the uncertain economic feasibility of oil shale development, However, the leases did not authorize suspensions for economic reasons. In order to qualify for a suspension, a lessee would have to provide a justification in terms of resource recovery and conservation. On March 3, 1976, the remaining tract C-b partners requested a temporary suspension to study whether lands owned by the lessees could be exchanged for lands near the tract, thereby increasing the resource base that could be concurrently developed and overcoming some of the problems created by the weak shale.')' The request also cited the potential conflict with the Clean Air Act regulations, and the need for time to consider legislation to allow off tract land use. In addition, the transmittal letter mentioned a hostile governmental attitude towards the oil industry, as exemplified by price controls on petroleum and proposed legislation for severence taxes and divestiture, However, the principal foundation of the request was the need for further studies of a concept for developing the tract that would minimize wasting the public's resources. An 18-month suspension was requested. On August 20, DOI'S Area Oil Shale Supervisor granted a 12-month suspension (from September 1, 1976 to September 1, 1977). The lessees were required to continue environmental monitoring programs.

On July 2, 1976, Rio Blanco requested a 2-year suspension on tract C-a, citing the high background levels of natural air pollutants, denial of off tract land use, economic uncertainty, the absence of a favorable political climate, and the need to prepare new development plans that would maximize resource recovery. [56 58] DOI granted a l-year suspension (until September 1, 1977) with the provision for continuation of baseline environmental monitoring.

On July 19, 1976, the lessees of tracts U-a and U-b requested a 2-year suspension, citing that the time was needed for additional study to develop methods for improving resource recovery with acceptable costs, to determine whether the tracts could be developed in compliance with air quality regulations, and to develop an economically feasible retorting technology. DOI granted a l-year suspension (from November 1, 1976 to November 1, 1977).'>[] Continuation of baseline environmental monitoring was required,

Events During the Suspension Periods

During the suspension period, environmental uncertainties to tract development were removed through actions by the Environmental Protection Agency (EPA) and the State of

Colorado. In a letter dated July 5, 1977, to DOI'S Area Oil Shale Supervisor, EPA's Region VIII Administrator stated:[60]

> EPA does not feel that the air quality as represented by measurements on the Federal lease tracts precludes the development of the oil shale resources. Utilization of interpretative rulings, existing regulations, and policy statements would indicate that if a facility is designed to meet all appropriate State and Federal emission regulations and the applicable "incremental type" ambient standards, i.e., State and PSD, it may be constructed.

It is noteworthy that the statement implies that changes in policy were not required to accommodate development. EPA conclusions were based in part on analyses of the nature of fugitive dust in rural areas and the problems with high ozone concentrations in areas that contained no man-related sources of ozone or its precursor hydrocarbons.')' Since ozone and its precursors can be transported long distances, EPA's analysis indicated that regulatory actions directed at protecting air quality in rural areas would be more effective if applied to the distant urban areas that were the likely sources for the pollutants. In addition, it was indicated that areas like the oil shale region, which have low ambient concentrations of nitrogen oxides, are less subject to air quality degradation as a result o f hydrocarbon emissions from new sources (like oil shale plants) than are industrialized urban areas with high concentrations of nitrogen oxides. Because of the insensitivity of ozone concentrations to changes in the concentration of hydrocarbons, controls implemented in the oil shale region would have little effect on ozone levels.

The fugitive dust analysis indicated a difference between dust in urban areas and in rural areas. Rural dust is generally windblown material from sparsely vegetated land and unpaved roads. It is typically native soil and is not contaminated with industrial particulates, absorbed industrial fumes, or other potentially toxic substances. Furthermore, dust in rural areas is generally composed of relatiely large particles: it is the smaller size particulate that are most harmful to human health and welfare. Urban dust tends to contain more smaller sized particles, which are often made up of industrial particulate, either alone or adhering to natural particles. These are often contaminated with industrial vapors and gases, automotive exhaust fumes, rubber tire particles, and other materials that have been related to adverse health effects.

In summary, EPA concluded that stringent hydrocarbon emission regulations in the oil shale area would have little effect on ozone concentrations in the atmosphere. It also concluded that rural dust is substantially and significantly different from suspended particulate in urban areas, and is less likely to cause harm, even if present in concentrations in excess of the NAAQS.

The Region VIII EPA Office drafted a rural ozone policy that allowed construction of new hydrocarbon sources in rural areas where baseline ozone and hydrocarbon concentration exceeded ambient air quality guidelines, provided that the facilities complied with emission standards and regulations for preventing additional degradation in air quality. The policy was proposed only if the new sources were not near cities with populations larger than 200,000. It was however, never adopted by EPA in Washington.

A rural fugitive dust policy was also drafted, but never adopted, that allowed construction of new particulate sources in rural areas where baseline particulate concentrations exceeded the NAAQS, provided that the sources complied with emissions standards and used the best available pollution control methods. It was proposed that the emissions from the new sources, when added to emissions from other man-related sources in the same area, could not exceed the particulate standard developed for the area.

The second environmental problem was related to the standards for prevention of significant air quality deterioration (PSD) that were proposed by the Colorado Air Pollution Control Commission for controlling sulfurdi-

oxide (SO_2) concentrations. The Colorado standards that applied to the oil shale region are compared below with the corresponding Federal standards.

	Allowable increase in SO_2 concentration, g/m^3	
	Federal PSD standard for Class 11 areas	Colorado PSD standard for Category I ureas
Annual average	15	3
Maximum during any 24-hr period . . . ., ...	100	15
Maximum during any 3-hr period ., ...	700	75

An atmospheric dispersion modeling study performed by the Colony Development Operation indicated that the Colorado 3-hour PSD standard could not be satisfied by even the smallest practical oil shale retort, and would certainly be exceeded by a commercial-scale retort even if the best available air pollution control methods were used. Thus, oil shale plants would be prohibited in Colorado's oil shale regions.[62] In March 1977, hearings were held concerning the proposed regulations. Considerable testimony was presented both favoring and opposing the regulations.

The PSD standards for the oil shale region were subsequently revised to agree with the Federal standards.[63] According to the Colony study, this revision would have permitted an industry of at least 400,000 bbl/d in the Piceance basin.[64] It also would allow other developments (such as powerplants) to be built in the oil shale area and other parts of the State.

Also during the suspension periods, the technological approaches to developing tracts C-a and C-b were revised. As noted previously, Tosco Corp. and Atlantic Richfield withdrew from the C-b tract in December 1975 as a result of escalating project cost estimates. On November 2, 1976, Shell Oil Co. withdrew from the tract because of continued economic uncertainties, and on November 4, Ashland Oil Co. (the last of the original four participants) announced a partnership with Occidental Oil Shale, Inc. The companies proposed to develop tract C-b with Occidental's modified in situ (MIS) retorting technology. * MIS processing reduces the need for aboveground facilities because the retorts are underground. Waste disposal, although still a substantial problem, is considerably less than in aboveground retorting operations. Because large, permanent underground openings are not needed, the technique was believed to be applicable to structurally weak shale deposits like those encountered on tract C-b. Furthermore, it was claimed at that time that MIS processing would produce shale oil for about half the cost of aboveground retorting, and that resource recovery would increase fourfold (from 300 million to 1.2 billion bbl).

On March 1, 1977, the tract C-b lessees submitted a modified DDP to DOI's Area Oil Shale Supervisor that changed the approach to tract development to MIS processing. On May 25, Rio Blanco submitted a plan for developing tract C-a by MIS methods, rather than by open pit mining and aboveground retorting as originally proposed. At the same time, Rio Blanco also applied for an extension of the suspension period beyond the September 1 deadline, if the problems with environmental baseline measurements were not resolved prior to that time. The request was denied because the issue was resolved by the EPA Regional Administrator on July 5. On August 30, DOI approved the modified DDP for tract C-b's MIS operations. On September 1, suspensions for tracts C-a and C-b were terminated. On September 22, DOI approved the modified DDP for tract C-a.

The suspensions for Utah leases were not terminated at the original November 1 deadline. On April 17, 1977, the Utah lessees filed a complaint in the U.S. District Court in Salt Lake City, seeking an injunction against the Federal Government to prevent continuation of the lease provisions until the issues surrounding ownership of the lease tracts were resolved. On July 1, Judge Ritter granted the injunction because:[65]

a. If plaintiffs proceed with development of the leased deposits, they would be sub-

*MIS processing and other oil shale technologies are described in ch. 5 of vol. 1.

ject to the risk of losing the monies and resources expended in development.

b. If plaintiffs retain the leases, but do not proceed with development, they would suffer the loss of monies paid as bonus payments that otherwise could be spent on development.
c. If plaintiffs relinquish the leases, they would risk the loss of the monies expended to date on bonus and rental payments and preparation of the Detailed Development Plan,

The injunction was issued with an effective date of May 31, 1977, and was to continue until ownership of the land and the right to develop the tracts were settled by the resolution of the suits between Utah and DOI, Peninsula Mining and Utah, and DOI and the holders of rights to unpatented mining claims.

Resumption of Activities and Current Status

Tract C-a

In January 1978 shaft sinking began on this tract in preparation for a modular MIS retort demonstration program. The program was to involve five sequential retorts of increasing size, and was to be completed by 1981. These retorts were to be based on a concept developed by DOE's Lawrence Livermore Laboratory. They were to lead to commercial-scale operations by 1987 in which MIS retorts would be used in conjunction with TOSCO 11 retorts to produce 76,000 bbl/d of crude shale oil. In 1979, Rio Blanco executed a licensing agreement with Occidental Oil Shale that provided access to proprietary technical information acquired during Occidental's field experiments with MIS retorting. Also in 1979, Rio Blanco submitted another modified DDP in which its schedule was changed to include the operation of three modular MIS retorts through 1981. The first retort will be about 30 ft on each side and 200 ft high, and will be used to develop techniques for rubbling and combustion. It was-scheduled to be burned in June of 1980, The second retort will be 60 ft on each side and 400 ft high and will also be burned in 1980, The third experiment may involve two parallel retorts, each 60 ft on each side and 400 ft high, or a single retort measuring 60 ft by 150 ft by 400 ft high, Rubbling will be completed late in 1980 and the burn is scheduled for mid-1981. Additional retorts may be constructed and burned after the end of 1981. The retorts will probably be of commercial size and may be as high as 700 ft.

Rio Blanco is also considering Lurgi-Ruhrgas aboveground retorts to process the shale that must be mined to create the in situ retorts. Current plans are to invest $100 million in a modular retort development program in which a 4,40@ ton/d Lurgi-Ruhrgas module would be used to produce about 2,000 bbl/d of crude shale oil. An agreement for the engineering design phase of the program was signed by Rio Blanco and American Lurgi Corp. on July 16, 1979, The plant could be in operation within about 3 years. Commercial-scale operations at about 76,000 bbl/d could be attained by 1987 if there are no further project delays.

Tract C-b

In February 1978, a contract was let for shaft sinking on this tract in preparation for an MIS retorting demonstration, Shaft sinking and the preparation of surface facilities began in early 1978 and are continuing. On December 15, 1978, Ashland Oil Co. announced its withdrawal from the tract effective February 14, 1979, leaving Occidental as the sole developer. Ashland's decision was prompted by:[66]

> . . . economic studies that suggest increased capital and operating costs may reduce profitability in the face of technical, political and regulatory uncertainties. This decision is in keeping with Ashland's corporate policy to emphasize projects that promise cash flow commensurate with capital requirements.

Ashland transferred its share of the lease to Occidental at nominal cost, but retained the right to recover its development investment of about $37.5 million from any sales revenues that may ultimately result from commercial operations on the tract,

On July 25, 1979, Occidental sold a half-interest in the tract for $110 million to Tenneco Oil Co. The tract will be developed jointly by the companies, Tenneco would have full rights to use Occidental's MIS technologies both on the tract and in any other development ventures in which it may become involved. Full-scale commercial production of 57,000 bbl/d is anticipated in 1986. No plans have been announced to process the mined shale in aboveground retorts.

Tracts U-a and U-b

Ownership of these Utah tracts is still uncertain. Although the U.S. Supreme Court found in favor of the Federal Government in the in-lieu lands case, they found in favor of the Colorado claimholders in the case of the unpatented mining claims. Although the claims in question are in Colorado, the outcome could have implications for future development in Utah. If the precedent is applied to the unpatented mining claims overlying tracts U-a and U-b and if these claims were declared valid under the precedent of the Shell Oil decision, the existing Federal leases in Utah could be affected, The issue remains unsettled as of the time of this writing.

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[59]Supra No. 49, at pp. 71.72, and 76-80.

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[61]Supra No. 49, at pp. 101-105.

[62]Cameron Engineers, Inc., Synthetic *Fuels,* vol. 14, No. 2, June 1977, p. 2-6.

[63]Supra No. 48, at pp. 2-12 and 2-13.

[64]Supra No, 62.

[65]Supra No. 48, at p. 5-19.

[66]*Prototype Oil Shale* Leasing Program, Department of the Interior, U.S. Geological Survey, Area Oil Shale Office, Grand Junction, Colo., Jan. 15, 1979, p. 15.

CHAPTER 5

Key **Issues in the** Prototype Program

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Key Issues in the Prototype Program

Introduction

During the Program's designn phase and at the time of the lease sales, it was widely assumed by Government and industry spokesmen that shale oil production was close to commercial feasibility and that commercialization efforts would commence once industry was allowed access to rich oil shale deposits on Federal lands. Thererefore, the Program was focused solely on the leasing issue. I t lacked some of the features of Secretary Udall's program. such as consolidating scattcred private holdings and clearing disputed land titles. It also did not provide supporting R&D to resolve the technical problems that were apparent at the time and, more importantly, to provide expertise when new problems were encountered on the tracts. All of these efforts and capabilities rested in other branches of the Department of the Interior (DOI) or in other Federal agencies.

These deficiencies were partially compensated for by other aspects of thc Program such as the 'involvement of State government and public in the design and subsequent phases, the leasing terms, and the provisions for environmental protection. In addition it was intended that the Program change over time as knowledge was gained and problems encountered. Many such problems arose as the Program proceeded. These, along with the uncertainties they engendered, slowed the Program's progress, disrupted the original development schedules, and raised serious doubts about continuation of the entire effort. This chapter summarizes some of the technological, political, legal, environmental, and economic issues that surrounded the Program, and describes their effects on its schedules and status.

Technological Issues

The problems with low rock strength that were encountered on tract C-b led the lessees to adopt modified in situ (MIS) processing; development schedules were delayed by at least a year as a result.. Technologica1 uncertainties were also associated with MIS because it had not been tested in shales similar to those found on C-b. Similar complications arose when Rio Blaco decided to switch from open pit mining and above-ground retorting to MIS.

Process development work for the MIS technique includes partial Government funding of a retort development program on Occidental's land along Logan Wash in Colorado. In Phase I of this project, the Department of Energy (DOE) provided $14 million for comparing two retort designs that were being considered for commercial-scale operations on tract C-b. Oil recoverv was poor from the first test retort, and a struct ural failure occurred in the second retort soon n after the rubble was ignited. Operation of the second retort (the sixth that Occidental has created a t Logan Wash) has been completed and data have been acquired, However, MIS appears to have some technological problems. * To expedite the development of the first commercial-scale retort, the second design will be further tested in Phase II, also at Logan Wash. The Government is contributing $24 million (52 percent) of the Phase 11 cost.

The tract C-a lessees are also in the process-development stage as a result of their adoption of MIS methods. As mentioned previously, this tract original MIS concept was

* The problems with MIS and the other developement technologies are discussed in ch. 5 of vol.I

based on technology developed by the Lawrence Livermore Laboratory. It comprises a mathematical model supported by small-scale experiments in simulated in situ retorts. Rio Blanco had planned to advance its status with a modular retort development program on tract C-a. Now that Rio Blanco has access to Occidental's MIS technology, it should be possible to accelerate the program. Shaft sinking in preparation for the modular program has been completed, However, problems with large inflows of ground water necessitated modifying the mining plan and delayed the ignition of the first retort. The possibility of testing aboveground processes also exists with the announcement that Rio Blanco has obtained a license to investigate the use of Lurgi-Ruhrgas retorts for the mined portion of the shale.

It should be noted that DOE—and its predecessors the Federal Energy Administration and the Energy Research and Development Administration—has been the primary Federal agency stimulating private industry's development of commercial oil shale technologies. DOE has, and continues to finance a variety of mining and processing technologies. Some projects are of an R&D nature; others are specifically aimed at commercialization. * Certain goals of the Prototype Program, therefore, are being supported outside the formal framework of the Program,

*See vol. I, ch. **5, p. 172** for a description of DOE'S programs.

Environmental Issues

Oil shale development, and the Prototype program in particular, is permeated with highly controversial issues, because the physical and social environments will be altered. Careful planning and numerous safeguards will be needed to confine the disruptions to acceptable levels. This reality was acknowledged by the Program's authors and by the tract lessees whose development work is governed by environmental statutes and who state support for protecting the environment. The developers are also concerned about environmental standards that could preclude profitable projects.

To the proponents of oil shale development, the potential economic, social, and environmental benefits appear to outweigh the disadvantages. They maintain that the only way to obtain the benefits is to proceed with development while concurrently working on control and restoration techniques to minimize the ecological damage. They further maintain that sufficient work has been done with respect to spent shale disposal, airborne emissions, and land restoration, and that there is adequate information to justify taking the next step.

Oil shale's critics, on the other hand, maintain that there are more attractive energy sources than shale oil, that critical environmental information is lacking, and that it will be very difficult, if not impossible, to develop oil shale without unacceptable environmental damage. They further maintain that commercial-scale facilities should not be permitted until there are better answers to the technological and environmental questions. They generally approve of Government support of research activities aimed at answering these questions. However, they view as inappropriate any Government actions that are directed at near-term commercialization, land exchanges for the purpose of creating commercial-size tracts, attempts to lease additional tracts within the Prototype Program, large-scale subsidy programs, offtract waste disposal, increases in lease tract size to encourage larger scale operations, and suspensions of leasing provisions in an attempt to avoid due diligence requirements.

Proponents and critics also disagree about the overall purpose of the Prototype Program, at least with respect to its goal of environmental protection. The Secretary of the Inte-

rior, in his decision statement regarding the Program, identified as one of its major goals:[1]

> To insure the environmental integrity of the affected areas and, concurrently, define, describe, and develop a full range of environmental safeguards and restoration techniques that can reasonably be incorporated into the planning of a mature oil shale industry.

This statement has led to much controversy. For example, the phrase "insure integrity'* could be interpreted to imply preservation of the existing environment. This would preclude oil shale development on any scale as well as many other activities within or near the affected areas. Another interpretation would imply that adverse impacts will be minimized and mitigated and that some form of ecological balance, although not necessarily the original one, will be established on completion of the development work. This interpretation would allow development if undertaken in recognition of environmental requirements and regulations. Critics tend to prefer the former interpretation; proponents the latter. The phrase "that can reasonably be incorporated, " similarly allows differing interpretations.

In 1976, a DOI official restated the Department's philosophy regarding the Prototype Program as follows:'

> The Department of the Interior has not changed its views on the importance of our oil shale resources and the value of the Prototype Program to learn how best to develop this resource under strict controls. In announcing suspension of operations on August 20, 1976, the Secretary stated that "We have not relinquished our goal of demonstrating the feasibility of shale oil production on a commercial basis. " The Department does not consider the problems facing oil shale development to be insurmountable either individually or in aggregate.

Some environmental conservation groups have identified these and other aspects of the Program as basic inconsistencies. They maintain that commercialization cannot proceed, nor can a base for such commercialization be established, while maintaining environmental integrity. Although DOI incorporated environmental protection provisions into the tract leases, critics have expressed concern that these provisions are not adequate to prevent damage to the physical and social environments. They argue that the Program should have been structured as an R&D effort, rather than as the first step towards a commercial oil shale industry. Some concerns over the evolution of the Program were expressed by a representative of the Colorado Open Space Council in 1977 testimony before the Senate:

> The prototype program is still active but it is a much different beast than the limited, experimental program as advertised. Serious problems have plagued the program since the final design was announced in November 1973. We trace these problems to the continuous efforts to re-define and/or expand the program and the lack of specific criteria by which to judge the success or failure of the program, to govern the workings of the program and time limits. These efforts have been made by the lessees, the Department of Interior and other Federal agencies, and by Congress. In other words, instead of running a carefully controlled and defined experiment, whose results of success or failure would be equally informative, it has been an attempt to make it succeed by almost any means . . . I would like to briefly list the items: One is suspension of bonus payments due on the oil shale leases, . . . the attempt to add two more lease tracts supposedly for in situ development to the prototype program, land trades that have been proposed, subsidy programs that have been proposed, and off-site dumping.

DOI has not accepted the definition of the Prototype Program as an R&D project, and has continued to act to support facilitating development of a base for an oil shale industry. Officials emphasize that one of the Program's major objectives was to develop

*The statement also critixized DOI's actions with respect to preparation of an environmental impact statement (EIS) for the Colony project, These actions were taken outside of the Program and with not he discussed here. The additional leases proposed for in situ developement are discussed later

environmental safeguards and restoration techniques in conjunction with establishing an industrial base. They maintain that only with such a base can environmental impacts be determined, and mitigation procedures verified or disproved.

Along with their perception of inconsistent goals, critics of the Prototype Program have stated that the Area oil Shale Supervisor (DOI's control official for the lease tracts) is forced to act in the dual role of promoter and regulator and that these roles conflict to the detriment of maintaining the environment. On the one hand, the Supervisor is responsible for advancing the Program in a timely manner. On the other hand, he is required to ensure that regulatory laws are obeyed, even though adherence may disrupt or delay activ-it ies on the lease tracts, Critics have expressed the concern that, with his dual responsibility, the Supervisor may choose the promoter role too often.

Some environmental activist groups also claim that they were improperly excluded from the design phase of the Prototype Program, and that they have subsequently been excluded from the decisionmnaking processes that have shaped its evolution. In particular, they claim that the Oil Shale Environmental Advisory Panel, which was established by DOI to review the program's actions and advise the Supervisor on key environmental issues, is not truly a public body. Concern has been expressed that the panel included too many representatives of Government agencies and interest groups that may have a pro-development bias. In this regard, 3 of the 30 members of the original panel were associated with environmental activist groups. The panel was recently reconstituted, and now comprises 26 representatives of the following organizations:

- the Bureau of Land Management;
- the U.S. Geological Survey:
- the Bureau of Mines;
- the Fish and Wildlife Service;
- the Water Power Resources Service (formerly the Bureau of Reclamation);
- the Bureau of Indian Affairs:
- the Solicitor General's Office of DOI;
- the Environmental Protection Agency (EPA);
- one from each of certain Federal executive branch departments;*
- two each from the State legislatures and agencies of Colorado, Utah, and Wyoming, to be designated by the respective Governors;**
- one each from the regional planning commissions or boards of supervisors in areas of Colorado and Utah that include the lease tracts; and
- four to be designated by the Secretary of the Interior including two persons active in environmental or other public interest matters and two persons active in industry or energy matters.***

Differences both in perception and in value judgments have made environmental issues the most highly polarized of oil shale's many issue areas. Disputes will no doubt persist for the duration of the Prototype Program, and will certainly be encountered in any other commercialization programs. It is anticipated that environmental conservation groups will continue to monitor activities on and off the lease tracts, and will appeal to the courts for relief when they feel that environmental statutes are being violated. To date, appeals to the courts have not significantly affected developer schedules.

Just as some of the technological goals of the program are being met by DOE, some of the environmental ones are being met by EPA. An annotated listing of the Agency's research can be found in EPA's Program Status Report, "Oil Shale 1979 Update. "[4] This publication

*The May 2-3, 1979, panel meeting was attended by representatives of the Departments of Transportation; Energy; Housing and Urban Developent; and Health, Education, and Welfare.

**The May 2-3, 1979, panel meeting was attended by representatives of the Colorado Department of Health, the Colorado Department of Natural Resources, the Utah Division of State Lands, and the Utah legislature.

***The May 2-3, 1979, panel meeting was attended by representatives of the Friends of the Earth and the Institute for Environmental Studies of the University of Washington, and by two consultants to industry.

provides details of EPA's multimillion-dollar funding of oil shale environmental R& D.* Like the support from DOE, this work falls outside The specific framework of the Prototype Program.

*Many of these efforts are discussed in Ch.8 of vol.1.

Legal and Political Issues

Legal and political uncertainties have pervaded the Prototype Program since its inception, One of the more complex legal issues was associated with the ownership of the Utah lease tracts. The suit over the in-lieu lands has now been settled in favor of the Federal Government. The issue of unpatented mining claims, however, appears to be further clouded. The Court decided in favor of the owners of unpatented mining claims in Colorado, and if the decision is applied to unpatented claims overlying the Utah lease tracts, ownership of the tracts could revert to private parties, Continuation of tract development would then depend on negotiation with the new owners.

'The magnitude of the potential effects of the validation of other pre-1920 claims will depend on their number and location. Between 36,000 and 40,000 oil shale placer claims were located before 1920 in the tristate region. Between 1920 and 1960, when DOI stopped issuing patents, 2,326 claims covering 349,088 acres were patented, In 1968, based on a detailed analysis in Colorado and on old records and a preliminary review in Utah and Wyoming, DOI estimated that there were approximately 36,000 unpatented shale claims remaining. There were also about 16,500 unpatented metalliferous claims that were located mostly during a claims rush in 1966-67, just before withdrawal of oil shale land from any further locations of any kind of mining claims. Most, if not all, of these metalliferous claims have been canceled for lack of discovery or failure to satisfy other requirements of the Mining Law See table 3.

The pre-1 920 shale claims, according to the DOI estimates, encompassed approximately 5 million acres. This is roughly two-thirds of the Federal and half of the total land with commercial potential. (See table 4), In Colorado, the estimated 400,000 acres of unpatented claims generally are located along the southern and western edges of the Piceance basin. The center of the basin, where the richest shale lies and the present Prototype leases are located, is almost entirely Federal land for the most part free of pre-1920 claims. The claims in Colorado encompass only about one-fourth of the Federal total acreage. In Utah and Wyoming, however, over two-thirds of the Federal land had overlying unpatented claims, according to the 1968 DOI estimates, although it has been more recently reported that no pre-1920 claims remain in Wyoming.[5]

More accurate and timely information about the number and location of the unpat-

Table **3.–Mining Claims in the Tristate Oil Shale Region, 1968**

	Number of claims			
	Colorado	Utah	Wyoming	Total
Pre 1920011 shale	9000	15,000	12000	36,000
Post 192(I metalllferous				
Dawsonite	3,450	1,750	–	*5,200*
Platinum	2 150			*2,150*
Gold gilsonite uranium others	600	3550	5000	*9150*
Subtotal metalilferous	6200	5,300	5,000	16500
Total claims	15.200	20 300	17000	52. 500

SOURCE: U.S. Department of the Interior, *Prospects for Oil Shale Development: Colorado, Utah, and Wyoming*, 1968

Table 4.–Nature of Claims on Oil Shale Lands With Commercial Potential, 1968
(thousands of acres, estimated)

	Colorado	Utah	Wyoming	Total
Land with commercial potential				
Total	*1,800*	*4,900*	4,300	11,000
Federally owned	*1,420*	*3,780*	2,670	7,870
Percent of total	*79'YO*	*77YO*	62'Yo	72%
Non-Federal oil shale land				
011 shale patents	*260*	90		350
Indian, State, homestead, etc	*140*	2,610		2,750
Subtotal	*400*	1,100	1,600	3,100
Percent of total land	*22%*	*22%*	37?0	28Y0
Unpatented claims				
Pre-1966 (almost all 011 shale)	*400*	*2,600*	2<200'	*5,200*
Percent of Federal land	*28'Yo*	*69Y0*	82%	*66Y0*
Percent of total	*22%*	*53Y0*	51 Yo	*47'YO*
1966-67 (all metalllferous)b	*700*	*400*	400	1,500
Percent of Federal land	*49Y0*	11%	15Y0	19Y0
Percent of total land	39%	8Y0	9%	1470
Total claims	1,100	3,000	2,600	6,700
Percent of Federal land	77'0/0	79%	97Y0	85%
Percent of total land	617,	61 ~,	60Y0	61'h
Federal land without unpatented claims	320	780	70	1,170
Percent of Federal land	23Y0	21 ?0	3%	1570
Percent of total land	18'Yo	16'?/0	2Y0	11 "/0

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SOURCE Of flee of Technology Assessment derived Iron] Oeparlment of !he Infer,or data

ented claims should be available soon, Section 314 of The Federal Land Policy and Management Act (FLPMA)[6] requires, for the first time, that mining claims be recorded with the Federal Government. The owner of an unpatented claim must have filed before October 22, 1979 (and must file before December 31 of each subsequent year), with the appropriate State land office, either a notice of intention to hold the claim or an affidavit of any assessment work that was performed. A copy of the notice or affidavit, including a description of the location, must also be filed with the Bureau of Land Management in DOI, With this information, it will be possible to determine the possible effects of any future validation of unpatented shale claims.

Two issues related to environmental protection have prompted legal action. The first case began on December 21, 1976, when the Environmental Defense Fund, the Colorado Open Space Council, the Friends of the Earth, and the Denver Audubon Society filed a suit against DOI that questioned DOI'S authority to grant suspensions of lease terms. The case was dismissed without prejudice because of improper jurisdiction, and because indispensable parties (the lessees) were not included among the defendants,

The second case opened on December 6, 1977, when the Environmental Defense Fund, the Colorado Open Space Council, and the Friends of the Earth filed suit in the U.S. District Court in Denver seeking an injunction against further development of tracts C-a and C-b until site-specific EISS for each of the tracts were prepared and processed according to the procedures established under the National Environmental Policy Act (NEPA). The defendants were the Secretary of the Interior, the Area Oil Shale Supervisor of the U.S. Geological Survey, the director of the Colorado State Office of the Bureau of Land Management, Gulf Oil Corp. and Standard Oil Co. of Indiana (the C-a lessees), and Ashland Oil Co. and Occidental Oil Shale, Inc. (the C-b lessees at that time).

The plaintiffs maintained that NEPA had been circumvented in that the development methods proposed for both tracts had not

been described and their effects evaluated in the 1973 EIS which, according to the plaintiffs, only evaluated the leasing of lands, Thus, a new site-specific EIS was required for each tract. Approval of the detailed development plans (DDPs) in the absence of such analyses was therefore unlawful. According to the plaintiffs, the sole issue in the litigation was the adequacy and the legality of the procedures followed in preparing, reviewing, and approving the DDPs, The plaintiffs' motion for summary judgment stated:[7]

> Specifically, the plaintiffs contend that the federal defendants must prepare and circulate an environmental impact statement ("EIS") prior to acting upon detailed development plans (" DDPs'") submitted by the lessees of federal prototype oil shale tracts C-a and C-b and the numerous associated right-of-way applications across federal lands .... It is crucial to note what plaintiffs' motion does not seek. It does not seek to terminate the prototype oil shale leasing program. It does not seek to force the lessees to relinquish their leases. It seeks only to have this court require the federal defendants to prepare an EIS which analyzes the serious environmental and human health risks posed by planned operations on the federal oil shale tracts and by the associated rights-of-way prior to approving these plans.

In response to this motion and the plaintiffs' extensive exhibits, the defendants submitted a memorandum and exhibits that included the 1973 EIS, the modified DDPs for the tracts, reports of public meetings held in regard to the DDPs, and other supporting reports and correspondence. Judge Finesilver reviewed the various submissions and other information for several months. On August 28, 1978, he delivered a bench ruling upon cross motions for summary judgment. The record includes the following remarks:[8]

> In summary, we have found that the agency decisions made in ' 77 and '78 which determined that the DDPs and several rights-of-way applications could be approved without the preparation of supplemental EIS and made in full compliance with procedures mandated by NEPA, those decisions cannot be set aside by the Court, nor is there sufficient showing to warrant this Court in reversing that action , . . We are of the view that there has been compliance by the Defendant, the Federal Defendants in this case within the spirit and tenor of NEPA within the parameters of the EIS . . . That there is no viable action that has been substantiated that would lie against the Defendants in this case, The spirit and tenor of NEPA has continued throughout the implementation and operation of the leases . . . We are of the view further that the compliance of the Federal officials in this case has not been the minimum mandated by NEPA or Federal regulations, but it has gone above and beyond what we can describe as the minimal standards have (sic) that the compliance of activity by the Federal Defendants has been extensive in this project . . . Appropriate judgment shall enter in favor of the Defendants, and each of them individually against the Plaintiffs.

The plaintiffs appealed, and Judge Finesilver's decision was affirmed by a three-judge panel of the Ioth Circuit Court of Appeals in April of 1980. A petition for a rehearing en banc was denied. Plaintiffs had not decided as of this writing, whether to appeal further.

Changes in the interpretation of environmental regulations have had immediate implications both for the Prototype Program and for other developments that were being considered for the oil shale region. An example is the questionable significance of the high background levels of particulate, hydrocarbons, and ozone that were measured on the lease tracts during the baseline monitoring programs, This potential problem was identified by the lessees as a justification for the suspensions in 1976. The ruling of EPA's Regional Administrator, which was based on analysis of the origin of ozone and hydrocarbons and the properties of rural fugitive dust, appeared to remove the impediment to development, allowing a resumption of activities late in 1977.

However, on March 3, 1978, EPA headquarters in Washington declared that Rio Blanco County (in which tracts C-a and C-b were located] and the southern half of Uintah

County (including tracts U-a and U-b) were not in compliance with air quality standards because of high ozone concentrations." This ruling was a reversal of EPA's position in mid-1977. It restored the impediment because major construction, that would have increased the extent of the violation, would be banned. The tract C-a lessees, Occidental Oil Shale, and Rio Blanco County subsequently petitioned the Circuit Court of Appeals to review EPA's latest decision,[10-12] 1. The petitions were filed on April 4, 1978. On September 11, before the court could rule on the merits of the case, EPA again reversed positions and designated the areas as ones that "cannot be classified.[13]

Should this most recent decision prove to be the final one, then the issue is settled and oil shale plants would be allowed in the area if their control systems can be designed and operated in compliance with other air quality standards. However, some uncertainty lingers. In a letter dated November 8, 1978, to the Area Oil Shale Supervisor, an EPA official stated:[14]

> In my opinion the , ., settlement provides additional, but probably not complete, certainty that development of an oil shale industry will not be significantly constrained by the existing ozone concentrations.

Other uncertainties are associated with forthcoming PSD regulations for other air pollutants, and for visibility maintenance, as discussed in chapter 8 of volume I.

The Program has also been affected by political difficulties, partly because of the manner in which it was initiated and partly because of shifts in the political environment during its implementation, Like the 1968 leasing attempt, DOI developed the Program within the provisions of the Mineral Leasing Act of 1920, although it also considered more recent legislation. The lease terms were similar to those developed for exploring and extracting petroleum resources on the Outer Continental Shelf, Direct subsidies and other aspects that would have required congressional approvaI were avoided, and additional enabling legislation was not needed,

Thus, the Program was a product of the executive branch of the Federal Government. It was strongly supported by individual Senators and Representatives, especially from the oil shale States, but it did not enjoy majority support in the Congress, and efforts to obtain congressional approval of legislation that would have benefited the lessees were not successful. Examples include the failure of DOI'S attempt to obtain secretarial discretion in granting use of off tract lands for waste disposal and for facility siting and the subsequent passage of FLPMA's restrictions, the rejection of a proposal to use Federal land for housing areas in the town of Rangely, and the denial of loan guarantees and other subsidies for shale oil and other synthetic fuels. These actions conveyed, to the lessees, an impression of congressional hostility or at least disinterest, and contributed to concerns about the long-term economic feasibility of oil shale development.

Economic Issues

In his 1973 decision statement on the Prototype Program, Secretary Morton provided the following comments on economic aspects of oil shale development:

> Private sector participation in the design of the program, the provisions incorporated in the lease to encourage timely development, and of course, the rapidly rising price of crude oil, all suggest convincingly that there is high interest in the prototype program.
>
> But uncertainty in estimates about the cost of production of shale oil is very great, and for some technologies, estimates are quite pessimistic, The prototype offering of six sites was planned to allow trial of alternate methods of extraction,

> However, the best incentive we have to offer is the availability. at a fair return to the public. of the rich shale lands in the public domain. Therefore, I do not believe that under present circumstances a subsidy is either wise or necessary for this program.

At the time, conditions certainly appeared favorable for oil shale development, which seemed to offer secure resources to those oil companies that had previously relied on supplies from the Middle East, The recent tripling of world oil prices seemed to assure the profitability y of oil shale projects.

However, with the preparation of detailed engineering plans for specific oil shale plants, construction cost estimates soon began a precipitous rise. With rising costs, and with the emergence or intensification of risks and problems that were not foreseen in 1974, the attractiveness of oil shale projects declined. Rising project costs were most obvious with above-ground retorting technologies in the early years of the Program, perhaps because these technologies were sufficiently advanced to permit reasonably accurate cost estimates. However, cost escalations have since affected the relatively new concept of MIS processing, which in 1976 was claimed to be a much less costly approach to shale oil extraction. In March 1976, the DDP for tract C-b estimated a capital cost of $921 million for a 50,000 bbl/d above-ground retorting facility. In February 1977, the modified plan estimated a cost of $443 million for a 57,000-bbl/d facility based on Occidental's MIS technology. It was predicted that the project would reach commercial levels of production by 1983. [16] In April 1978, a spokesman for Occidental stated that cost estimates had risen to the range of $650 million to $750 million, 17 More recent estimates indicate a cost of at least $1 billion, and that commercial-scale operation is scheduled to begin in 1986. '[18]

The 1976 estimate corresponded to a unit investment of $7,750/bbl of daily production, the April 1978 estimate about $12,000 per daily bbl, and the more recent estimate about $17,500 per daily bbl. For comparison, recent estimates for TOSCO 11 above-ground retorts indicate an investment of about $25,000 per daily bbl. The economic advantage of the MIS approach has therefore decreased significantly.

A representative of Tosco has identified the major constraints on oil shale development as: [19]

1. risks inherent in scale-up of unproven processing technologies.
2. risks of noncompliance with existing environmental regulations,
3. risks of more severe regulations in the future, and
4, risks that the value of shale oil will be regulated to below its fair market value in comparison with imported crude.

Risks in the first category are real and will remain so until the first commercial-scale retorts are built and operated. With respect to the second category, current State and Federal standards do allow initital levels of development on all lease tracts and on many privately owned sites. Risks in the third category are real because future standards might be imposed that could prohibit development of large-scale plants, With respect to the fourth category, shale oil producers can expect world oil prices for their product. Those prices are high, and most financial analysts expect them to rise further. However, as described in chapter 6 of volume 1, the future price of world oil is uncertain, It could be depressed in the future to below the recovery cost of shale oil. Therefore, although concessions have been made to oil shale development, risks remain that raise questions about the willingness of energy companies and financial institutions to invest in a capital-intensive, long-term project whose success largely rests with unproven technology,

Chapter 5 References

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CHAPTER 6

Outlook

CHAPTER 6

Outlook

Objectives of the 1973 Program

The objectives of the Federal Prototype Oil Shale Leasing Program, as stated in 1973 by the Secretary of the Interior, are:

1. to provide a new source of energy to the Nation by stimulating the development of commercial oil shale technology by private industry;
2. to ensure the environmental integrity of the affected areas and at the same time develop a full range of environmental safeguards and restoration techniques that will be incorporated into the planning of a mature oil shale industry, should one develop;
3. to permit an equitable return to all parties in the development of this public resource; and
4. to develop management expertise in the leasing and supervision of oil shale development in order to provide the basis for future administrative procedures,

The Program was designed with the concept that six lease tracts in three States would be developed with significantly different mining and processing technologies, and that commercial-scale production of about 250,000 bbl/d would be achieved by 1980, However, the Wyoming leases were not sold, and development of the Utah tracts was suspended. Activity in Utah is limited to environmental monitoring and review of candidate development technologies. Before the ownership issue was resolved, the lessees stated their intention to resume development. Now that this issue is settled, and assuming unpatented claims are not an impediment, it will still take several more years before the Utah tracts can approach their initial production target of 100,000 bbl/d.

At present, only two lease tracts are being developed. Both are in Colorado and both involve similar mining and processing technologies. The more optimistic projection (Occidental's) suggests that commercial levels of production will be achieved no earlier than 1986. The tract C-a lessees predict commercial production in 1987, but at a lower level than envisioned originally, If both plans proceed on schedule, commercial quantities of shale oil (about 133,000 bbl/d) could be produced by the late 1980's. If unforeseen problems arise, commercial production (the Program's first major objective) could be delayed until the 1990's.

In its present form, the Program may not reach the production levels projected in 1973, and will certainly not reach them within the original schedule. Until recently it was also questionable whether the desired variety of mining and processing technologies would be tested. Underground mining to support modified in situ (MIS) processing appeared to be the only mining method that would be tested by the program, and it seemed possible that the demonstration of above-ground retorting (AGR) methods would be limited to Rio Blanco's trials of the Lurgi-Ruhrgas module on tract C-a.

Testing AGR is very important to a full evaluation of the technical, economic, and environmental aspects of oil shale development. AGR may be a feasible option by itself, and it also could be used to complement MIS processing. In MIS, at least 20 percent of the shale in the development zone is mined out and is not included in the MIS retorts. Options for disposing of the mined material are surface disposal (a waste of the shale's potential energy values), combustion for generating power and process heat (oil shale is not a very good solid fuel), or AGR. A facility that would combine MIS with AGR would be very efficient in terms of resource utilization.

The modified detailed development plan for tract C-b does not specify AGR of mined shale, although it is included as an option

without a stated time frame. ' It is likely that construction of an AGR facility will not begin on tract C-b until after the commercial-size MIS retorts have been operated for a few years. If setbacks occur on either tract, demonstration of aboveground processing methods could be delayed until well into the 1990's.

In 1978 the Department of the Interior (DOI) acknowledged the need to offer additional leases to encourage testing of above--ground methods,

> Finally, we recognize the need to encourage development of surface retorting technology, as well as other technologies which are not now being used on tracts C-a and C-b, and the substantial start-up time necessary to begin a commercial endeavor using a new development scheme.'

DOI also considered an adjunct leasing program specifically for in situ processing when the Wyoming leases were not sold. Although the original intention was to lease Wyoming lands for in situ development, the greater interest among potential developers in the richer Colorado deposits led to the nomination of four in situ tracts in that State, Work was begun on a supplemental environmental impact statement (EIS) for the new lease offering. The supplemental program was canceled when the tract C-a and C-b lessees switched to MIS processing.

As noted in chapter 5, support for most of the R&D programs aimed at commercialization of oil shale comes from the Department of Energy (DOE). Thus, although the first aim of the Prototype Program is to stimulate development, its implementation is by a Federal department different from the one responsible for the Program. Any evaluation of the Program must look at the full range of Government involvement when judging its success or failure.

With respect to the second goal of the Program—ensuring environmental integrity —it was anticipated that a framework would be provided for the evolution of techniques to restore the ecological balances that will be upset by oil shale development. Environmental monitoring programs have been established on each tract, and data from these programs will aid in detecting any environmental degradation resulting from development activities. Restoration techniques are also being developed, but the efficacy of these methods will not be verified until the tracts have been in full operation for several years.

Environmental investigations are being carried out by several agencies. As with support of commercialization, they are different from the Department overseeing the Prototype Program. Both DOE and the Environmental Protection Agency (EPA) have environmental R&D programs. This raises some basic questions about which agency is best suited to accomplish the objectives and whether there are more efficient or effective ways to accomplish them. Again, an evaluation must look at the complete range of activities being undertaken, not just at the efforts of a single agency.

The third Program objective—equitable return to all involved parties—has not yet been reached, Its achievement is tied to commercial shale oil production and, as such, is subject to numerous uncertainties. The economic and financial considerations of establishing an industry, as well as the tradeoffs necessary to accomplish this, are discussed in volume I.

The fourth objective was to develop expertise in leasing and supervision. In this regard, the Program has provided a training ground for DOI officials. The oil shale industry is unique among mining operations in that its modern development has taken place under laws and regulations such as those promulgated after the passage of the National Environmental Policy Act (NEPA) and the Clean Air Act. More established mining industries have had to adjust to environmental requirements, but their character has not been shaped by them as significantly as has that of the oil shale industry, where every process must be designed for compliance with environmental standards. Neither industry nor

Government could have anticipated the problems that have emerged in the course of the Program. Both sectors, however, have developed procedures for dealing with at least some of them. Moreover, although regulatory mechanisms have not functioned as speedily as might be desired by the developers, policies have been established that permit the development of the lease tracts.

New Initiatives

In 1978, DOI'S philosophy regarding additional leasing under the Program was expressed as follows:)

> To proceed with substantial additional leasing without the total experience which we will gain in Colorado would be a total contradiction of our established policy. Our current policy is to follow the guidelines laid down in the 1973 Oil Shale Environmental Impact Statement—to do no further general leasing until the prototype program has determined whether shale oil can be produced in an environmentally and economically viable manner. This may require some additional leasing in the near future to ensure that all available technologies for oil shale are adequately tested. However, this will be limited to only a few leases within the existing program and not a new full-scale leasing program,

In late 1979, DOI's Petroleum Imports Reduction Policy Group described the opportunities for additional leasing as follows:[4]

> In announcing the prototype program, the Secretary made a commitment to lease no more than six tracts under the program, and this has been taken as the lease limit for the program. This restriction was also contained in the programmatic EIS. Four tracts have been let. The two in Colorado are undergoing development: the two Utah tracts have been stalled by a legal challenge from the State of Utah. Consequently, there are two tracts of 5120 acres each which might be leased under the prototype program . . . The Department may not be limited to leasing two additional tracts, however. If the Prototype Program loses control over its tracts in Utah on "in lieu land selection" grounds, four tracts authorized under the Prototype Program would be available for leasing.

In May of 1980, DOI announced several decisions that mark a departure from these earlier positions and that will significantly alter the outlook for development. The choices were made, according to DOI'S decision document, "In response to the President's program to accelerate the development of a synthetic fuels industry and in full consideration of the potential and problems associated with the development of oil shale resources on the public lands. . . ."5

DOI will lease up to four new tracts under the Prototype Program. A task force will recommend the number and possible location of the new leases, the technologies to be encouraged, and the best strategy to accomplish the leasing. The task force's work is to be done by mid-fall of 1980.

Several justifications are cited for additional Prototype leasing. First is to ensure reaching a goal of 400,000 bbl/d of shale oil by 1990. While recognizing that this could be met by present projects, DOI indicates that "modest additional leasing" will foster production. Second is the need to strengthen the Program, which is characterized "as one of only qualified success, " particularly since only one technology is being tested in only one area. As the decision document notes:

> Additional leasing under the Program will permit us to gain the valuable broader experience first sought in the Program when the six lease tracts were selected and offered in 1974.

DOI emphasizes that the new efforts should be consonant with the purposes of the Program. Technologies not now being developed are to be encouraged, although lease

terms that stipulate the type of technology to be employed are not necessarily envisioned. At least one tract will be offered for multi-mineral development, Possible sites are not to be geographically concentrated, in order to reduce environmental and socioeconomic impacts.

Plans for a permanent leasing program will be started concurrently. According to DOI, "For the health of a maturing industry and the energy security of the Nation, oil shale production should continue to expand in the 1990's and beyond. " Because leasing to achieve additional production "is not fully consonant with the several purposes of the Prototype Program, " a comprehensive, permanent leasing program is proposed.

In preparation, four steps will be undertaken:

- a review of the Prototype Program;
- consultation with affected States, local governments, industry, the environmental community, and the public;
- consideration of a range of leasing alternatives, including no further leasing; and
- compliance with NEPA including preparation of a programmatic EIS.

The timetable calls for the review of the Prototype Program to be completed in 4 months, with a goal of having the permanent program ''in place within the next two years. "

Justification for the permanent program includes "The constantly changing national and international outlook for liquid hydrocarbons. . . ." DOI states:

> Failure to immediately initiate development of a permanent program poses the distinct risk that an emergency situation in the future would require the quick development and implementation of a poorly designed, crash leasing program, without adequate safeguards.

Land exchanges will not be given special emphasis. Rather, greater priority will be given to the leasing efforts. DOI judges exchanges as failing "too many tests as a desirable management tool. " Among the shortcomings are the inability to require diligent development and information sharing, which means greater production cannot be assured. Furthermore, bonuses, rents, and royalties are not obtained and the States do not receive shared revenues as they do from leasing. Finally, exchanges are viewed as inefficient and costly because of the necessity to analyze two or more tracts in order to effect the exchange. DOI does indicate it will fulfill its obligation to consider pending exchanges.

The Department will request amendments to the Mineral Leasing Act of 1920[6] and the Federal Land Policy and Management Act of 1976 (FLPMA). ' The former limits the maximum size of a lease tract to 5,120 acres (8 mi^2), prohibits any individual or firm from holding more than this acreage under lease, and allows only one lease to be held by an individual or firm." FLPMA specifically prohibits, outside the lease tracts, disposal of overburden or waste material and the siting of surface facilities.')DOI "will seek legislation which would remove all three constraints . . .

Specifically, DOI will ask for:

> . , . the authority to designate each lease tract of a size sufficient to sustain long-term commercial operations . , ., to issue permits to lessees for fair market value to provide for the off-lease disposal of shale and siting of processing facilities, and to permit a firm to hold a maximum of four leases nationwide and two leases per State, with an additional lease per State if the company is producing on the first two leases , . , and is within 10 years of completing production on one of them.

DOI is careful to note that they have not reached any conclusions about the specifics of their permanent leasing program, and that, therefore, the application of the off lease authority would be limited to the leases under the Prototype Program, either the existing ones or those to be issued under the Program's extension.

Taken together, these actions confirm a renewed interest on the part of the present

administration in the development of oil shale resources, The issues discussed in chapter 5 will move once again to the forefront of the debates about this development,

Chapter 6 References

1 *Shale Tract C-b—Modification* to *Detailed* Development *Plan*, Ashland Oil, Inc., and Occidental Oil Shale, Inc., February 1977.

[2]G. Martin, Assistant Secretary for Land and Water Resources, Department of the Interior, letter to OTA, U.S. Congress, Nov. 2, 1978.

[3]Ibid.

[4]C. Hall and M. Said, *Federal Oil Shale Leasing: Leasing* Options, *Legal and Policy* Constraints, Petroleum Imports Reduction Policy Group, Department of the Interior, Nov. 1, 1979, p. 14.

[5]James A. Joseph, Under Secretary, Memoran*dum to* the Secretary, "Decisions on the Oil Shale Secretarial Issue Document, ' U.S. Department of the Interior, May 27, 1980. Quotations throughout this section are from this *Memorandum.*

[6]*41* Stat. 437 (1920), 30 U.S. C. 181 et seq.

"90 Stat, 2743 (1976), 43 U.S.C. 1701 et seq.

[8]30 U.S.C. 181 and 241(a) (1976).

[9]90 Stat. 2786, 43 U.S.C. 1701.