
CHAPTER 3

Evolution of the Prototype Program (1969-74)

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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 enthusiastic 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

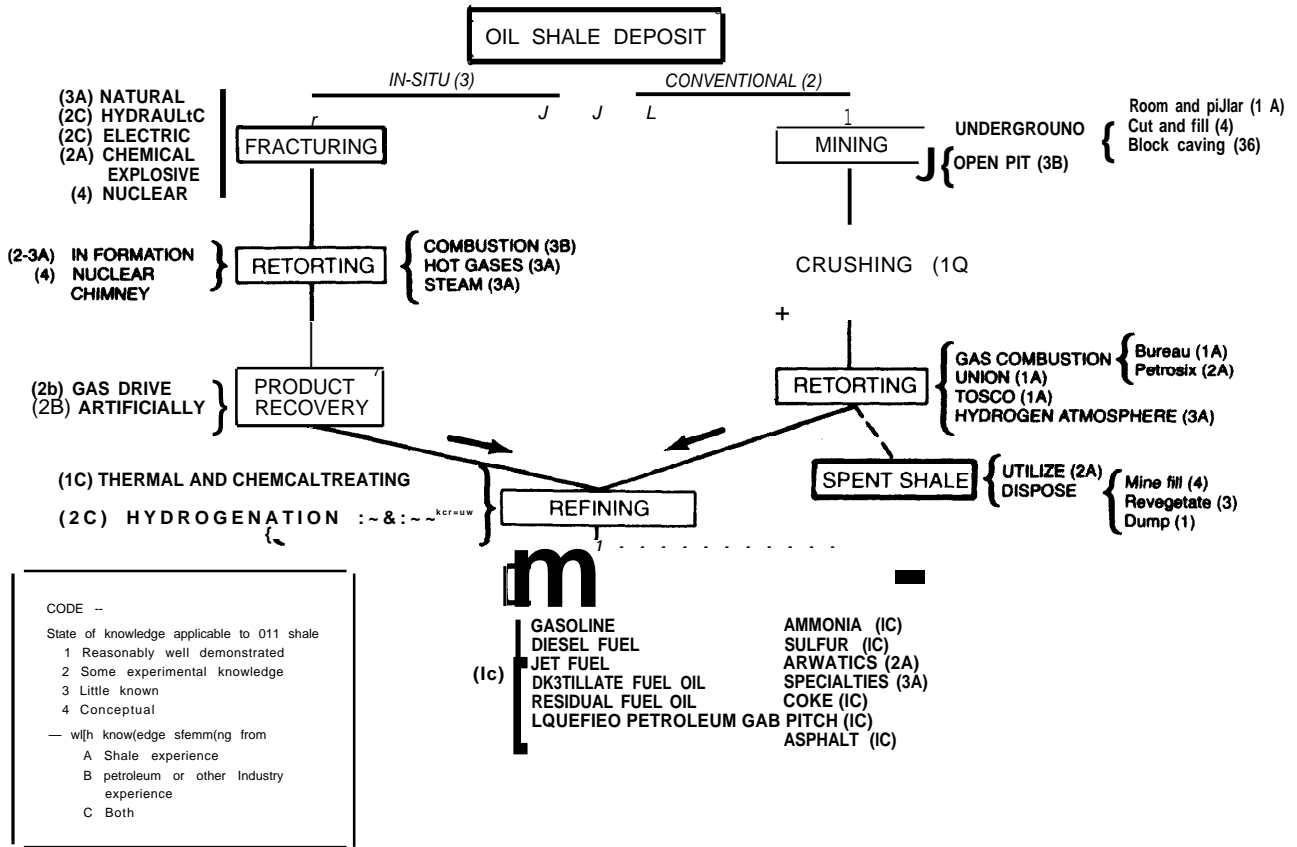
. . . we feel that industry is capable and willing to assume the enormous costs that are involved. We feel that by putting this solely and largely upon the private sector that more people will become involved in this and more rapid progress will be made because of the need of private industry to get 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.2510 . . . runs counter to the philosophy of the present Mining and Minerals Policy Act, which specifies that the Government's principal role is to en-

courage 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*—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 Oil Shale Development — Colorado, Utah, and Wyoming*, U S Department of the Interior, 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, DOI 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. * Be-

**Calvert Cliffs Coordinating Committee Inc. v. U.S. Atomic Energy Commission*, 449 F.2d 1109 (D.C. cert. denied, 404 U.S. 942; *Natural Resources Defense Council v. Morton*, 458 F.2d 827 D.C. Cir.1972). For a discussion of the legislative history and intended effect of the requirement for an environmental impact statement, see Richard N. L. Andrews, "Impact Statements and Impact Assessment, in *Environmental Impact Assessment* (Marian Blisset ed.), Engineering Foundation, 1975, at pp. 16-18.

cause 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.

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.,

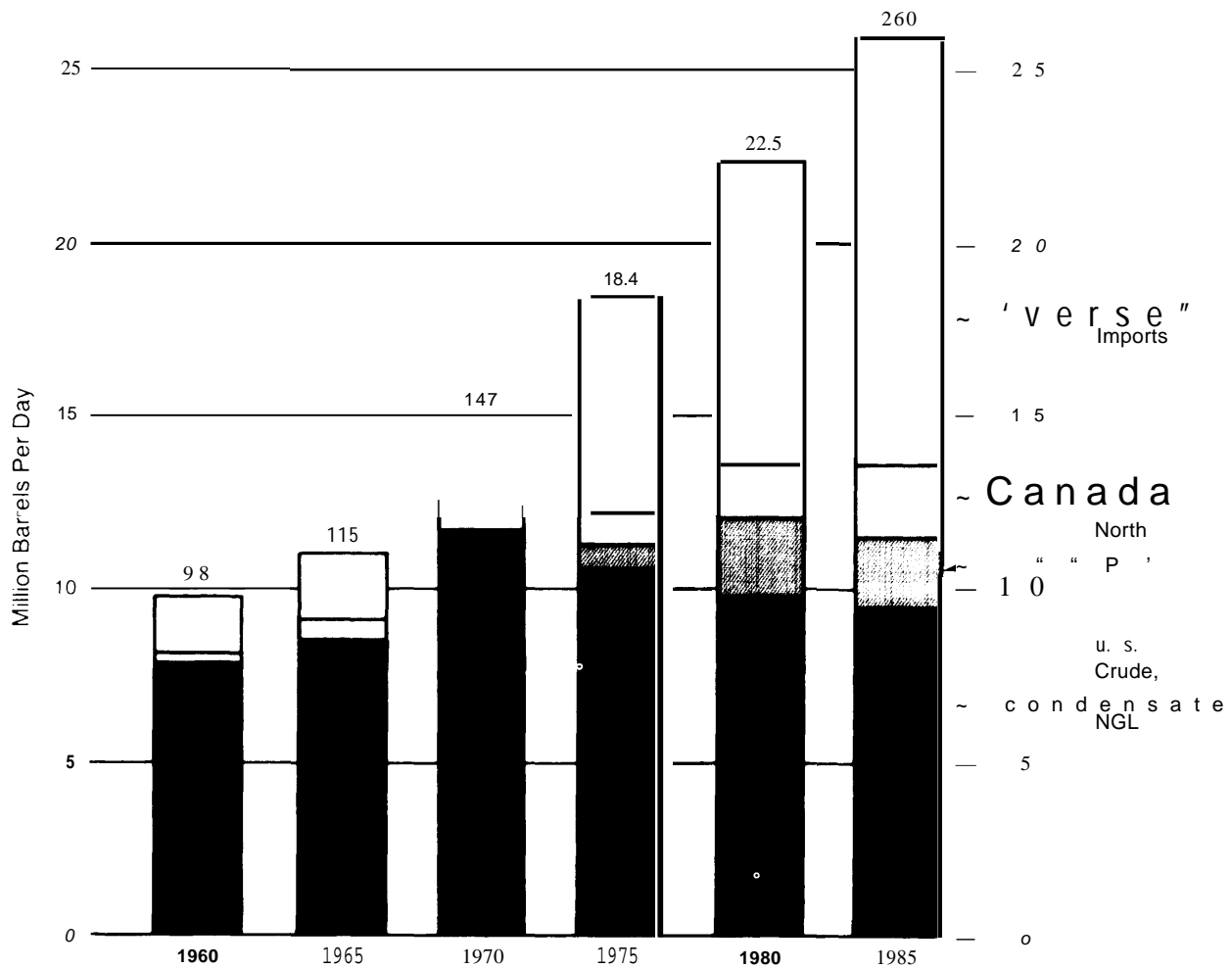
In figure 2, projections are shown for the components of the Nation's oil-supply system as they were viewed by the National Petroleum Council in 1971. A similar illustration was used by DOI'S Oil Shale Coordinator in a 1973 decision document that played a continuing role in the Program's justification 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

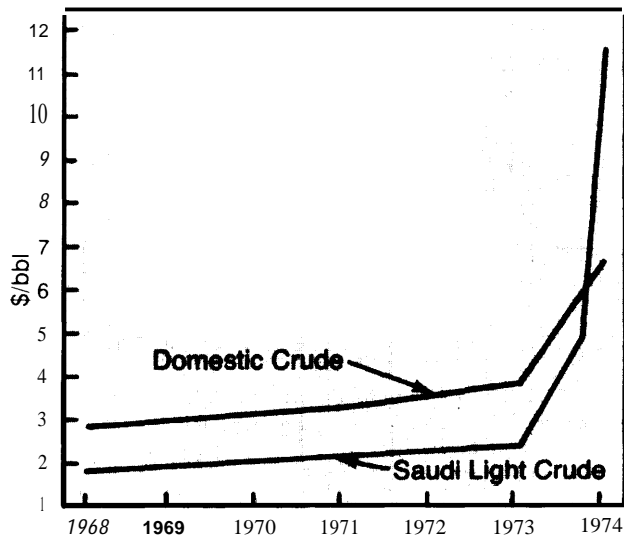


SOURCE U.S. Energy Outlook: An Initial Appraisal 1971-1985. The National Petroleum Council, July 1971, p. 27.

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 sup-

ported 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: Office 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.

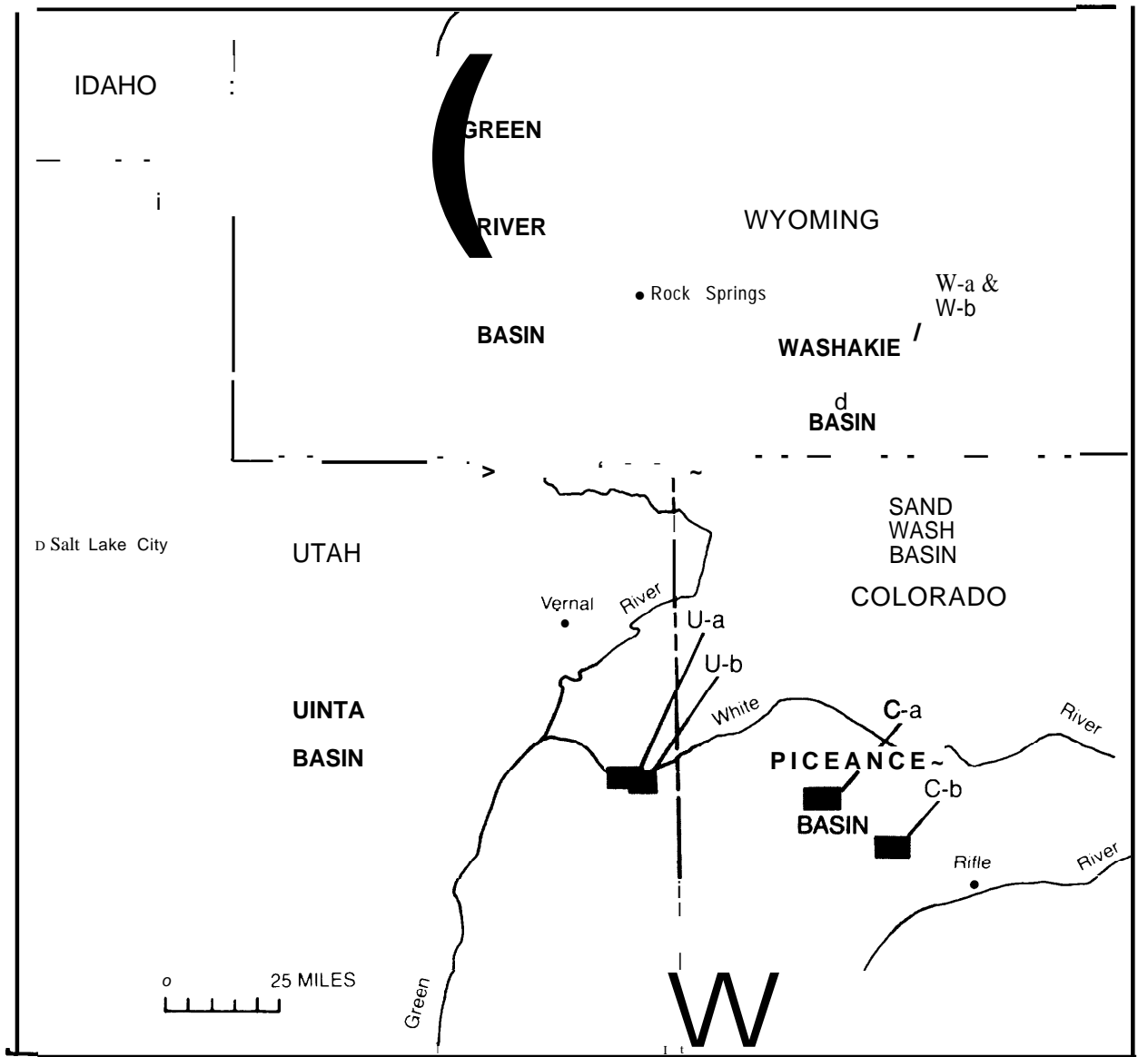
The Prototype Program Emerges

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 occur-

rence. 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 River formation

SOURCE T A sideK Recent Trends in 011 Shale— Part 3 Shale 011 Refing and Some 011 Shale Problems *Minerals Industries Bulletin* VOL 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 mi² (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	RioBlanco 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 ^c
W-a	Wyoming	5/14/74	None		In situ (suggested by DOI)
W-b	Wyoming	6/11/74	None		In situ (suggested by DOI)

^aIndirectly heated retorts (e.g., TOSCO II)

^bSubsequently unified for common development

^cCombination of indirectly heated and directly heated retorts (e.g., TOSCO II and Paraho or gas combustion)

SOURCE: Office of Technology Assessment

Chapter 3 References

¹Hearings 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.

²Ibid.

³Ibid., at pp. 19-25.

⁴Ibid., at p. 42.

⁵F. L. Hartley (Chairman and President, Union Oil Company of California) and J. M. Hopkins (Acting President of Union's Synthetic Fuels Division),

Joint Statement Before the Colorado Interior Legislative Committee on Oil Shale, Coal, and Related Minerals, July 23, 1974.

⁶Prospects 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.