

resource is to make an optimum long-term contribution to the economic well-being of the Nation, the major public policy questions need to be identified and evaluated at the onset." This report contains the Board's recommendations on the Federally owned oil shale deposits.

In July 1964 the Board held its first meeting in Washington, D.C. at which the Secretary indicated the general nature of the problems and the Board's assignment. Representatives of the Geological Survey described the tremendous oil shale deposits of Colorado, Utah, and Wyoming, and staff members of the Bureau of Mines summarized the Research related to oil shale which has been done.

The second meeting took place in Colorado oil shale country in September 1964, and gave the Board members a chance to see the locality and its special conditions. In the latter part of November 1964 the third meeting was held in Washington, D.C., with interviews of selected representatives from industries, professional societies and other interested groups. The fourth and final meeting was held in January 1965.

In line with the Secretary's instructions the Board has dealt only with a selected number of problems and opportunities for oil shale development and conservation. It has endeavored to develop general recommendations on the critical issues, rather than to present a detailed treatment of all aspects of oil shale problems.

On most of the points covered in the following report the Board found substantial agreement. For the most part disagreements occurred in the section on *Means of stimulating development of oil shale*. Individual statements relating primarily but not exclusively to this section are presented in the last section of the report. In a very few instances differences of views of individual members have been noted in brief footnotes.

The Board members are Joseph L. Fisher, Chairman; Orlo E. Childs, Benjamin V. Cohen, John Kenneth Galbraith, H. Byron Mock and Milo Perkins.

II. BACKGROUND INFORMATION

The salient facts concerning oil shale development that must be taken into account by Federal oil shale policy are summarized briefly here.¹

The so-called oil shale deposits in Colorado, Utah, and Wyoming are actually marls containing an organic substance called kerogen from which oil can be derived. These deposits underlie a total area of about 16,000 square miles and represent the largest known concentration of hydrocarbons in the world. Shale yielding 25 gallons or more of oil per ton contains about 600 billion barrels of oil equivalent, and shale yielding 10 gallons or more per ton contains about 2,000 billion barrels of oil equivalent—an amount about 25 times the total oil produced in this country through all of its history. These resources are not uniformly distributed. About 75 percent of the known deposits are in the Piceance Basin of northwestern Colorado, and in that area the oil shale ranges from less than 15 feet in thickness along the margins of the basin to more than 2,000 feet in the center. An area in the heart of the basin of about 350 square miles contains some 600 billion barrels of oil equivalent, and in parts of this area a single 5,120-acre plot—the size of the lease presently provided by the leasing laws—contains as much as 18 billion barrels, an amount equal to nearly 60 percent of the Nation's proved reserves of petroleum. The oil shale deposits are also not uniformly distributed vertically; high-grade and low-grade deposits are locally interbedded, and in the Piceance Basin the richest beds are in two separate zones, a lower one and an upper one called the Mahogany zone. The regional and local variations in the thickness and character of the oil shale require extensive exploration prior to the development, all of which has by no means been completed; even so, compared with many other kinds of mineral deposits, including petroleum, the deposits require far less exploration to determine grade, thickness, and reserves.

Many of the oil-shale lands also contain oil and natural gas, sodium minerals, and ground water. Water—essential for sale oil refining, for the communities that would support the oil shale industry, and for many other existing or potential enterprises—is in short supply, and must be used wisely. The land surface itself through agriculture, grazing, wildlife and recreation is also of considerable

¹ Factual material in this section was furnished to the Board by the Department of the Interior.