

Program

The cost of a 10-year program, based on these objectives, is estimated at \$3,500,000.

The work planned for the initial phase of the program will consist primarily of the following:

(1) Determining the amounts and nature of gaseous emissions from above-ground retorts of various types; (2) ascertaining the relationship of terrain to retort location and evaluating factors that bear on area-toxicity dispersion; (3) investigations of landfill requirements and possible utilization of spent-shale fill for constructive use as industrial sites and restoration of mined-out areas; (4) studies of spent-shale dumps from past operations to determine the siltation of water courses, amount of leaching of contained salts by rainfall over the intervening years since the dumps were originally formed, and the relationship of leaching of retorted shales to naturally weathered shales from talus slopes.

During the second phase samples and data will be obtained from experimental or commercial operations for detailed studies concerning pollution problems due to burning, fuming, smoke, and dust from fresh spent-shale dumps.

As commercial operations develop, continued and enlarged studies will be conducted on these problems. Among these are development of methods and determining costs of shale-dump stabilization and of reconstitution of retorted shales. Using spent-shale to fill arroyos on eroded lands; leveling and stabilizing spent-shale erosion moraines; and possible application of self-cementing and compacting procedures, using the cement type materials naturally present in spent shale also will be studied. These procedures, combined with methods that allow natural reconstitution into soil, will be investigated as well as the possible use of soil and vegetation cover, with a view toward ultimately rendering the spent-shale dump areas usable as agricultural and grazing lands.

Ways of preventing the leaching of excessive amounts of soluble minerals from spent shales by water from rain and melting snow will be sought. These dissolved minerals, if allowed to enter streams in uncontrolled quantities, could create problems for downstream communities.

Methods and costs of collecting and utilizing or disposing of dust from large-scale crushing and screening of oil shale will be studied. Shale fines may be screened from retort feeds and discarded. Measures may be needed to stabilize the shale-fines dump areas.

Liquid waste materials produced by oil-shale and shale-oil processing, such as waste oils, sludges, treating liquors, water contaminated with various oils, chemical and organic substances, and gaseous refinery emissions present serious potential difficulties. Methods must be found to prevent these substances from entering the atmosphere or draining into streams.

OIL SHALE ECONOMIC STUDIES

Objective

The objective of the general economic studies is to provide continuing and timely understanding of the complex economic interrelationships among oil shale and other energy sources, both on a regional and national basis, to serve as an aid in guiding the overall research program, and to aid in establishing Federal, State, and industry policies. The energy industry consists of a complex network of relationships among suppliers, processors, and consumers. Any change in the availability or cost of a source of energy, or the introduction of a new source either regionally, nationally, or internationally, can have far flung and subtle effects throughout the industry. The objective here is to understand the impact of the development of oil shale in all its ramifications and, conversely, to understand the responses of the other energy sources as they affect oil shale. Such an understanding will permit more perceptive policy responses. Economic studies related to resource planning are included under the Resources Development Planning Program.

Program

A series of special studies, as well as a continuing analytical appraisal, will be undertaken over a 10-year period at a cost of \$1,250,000. This series of studies will use as major inputs the analytical models developed in the general program.

One such special study will investigate the developmental impact of various assumed levels of shale-oil costs. This involves integrating with the assumed level of shale-oil availability the price elasticity responses of other energy sources and the development regional impacts resulting from alternative levels of market penetration. Corollary to this study will be in-depth examinations