

- A. Establish controlling parameters and evaluate their effects—
- (1) Resources evaluation and site selection and delineation.
 - (2) Subsystems research directed to oil-shale mining problems.
 - (3) Initial mine-system model design (evaluate research data for design purposes).
- B. Develop a mining system for oil shale—
- (1) Derive, test, and evaluate design components of the system.
 - (2) Prepare specifications, and contract for and test prototype equipment and techniques.
 - (3) Complete design of model mining system. Following is a description of the work contemplated in each phase.

Work Plan

Phase A: Establish controlling parameters and evaluate their effects.

- (1) Available data on oil-shale deposits will be evaluated to determine the resource and engineering data applicable for mine-system design purposes. It is anticipated that currently available data will have to be supplemented by additional drilling and sampling directed to a specified purpose. This work will be correlated with drilling and sampling proposed under other projects of this program. On the basis of the evaluation of these data, a site (or sites) will be selected.

- (2) Basic subsystems and engineering research will include work on all of the subsystem elements of a complete mining system, including rock fragmentation, ground control, materials handling, and environmental control. Systems analysis for each specific subsystem will be made.

- (3) Analysis of the total mining systems will incorporate the findings of the individual subsystems elements. This work will be expanded and directed to the investigation of oil-shale mining systems. An initial mine-system model design will be made for preliminary testing of proposed systems on the basis of available data and eventual refinement to an acceptable model.

All parts of Phase A will be carried on simultaneously and continued at varying levels for the life of the project. The basic part of the work should be completed in two years.

Phase B: Develop a mining system for oil shale.

Phase B, part B (1) can start and be carried on concurrently with the work on Phase A. Parts B (2) and B (3) depend on basic input from Phase A and part B (1) and will start upon completion of that work. Phase B work will continue at varying levels for the life of the project, but the basic part should be completed in four years.

- (1) On the basis of available information and additional data derived from research directed to the purpose, the opportunities and limitations of each subsystem of oil-shale mining methods, techniques, and equipment process will be determined, tested, and evaluated as a valid component of a mining system.

- (2) Based on Phase B (1), specifications will be prepared for applicable methods, techniques, and equipment; R and D contracts will be let as appropriate, and tests will be conducted on a prototype scale.

- (3) The model mine system will be completed, tested, and specifications will be prepared for full-scale demonstration.
- (4) Complete, test, and prepare specifications for full-scale demonstration of the model mine system.

Phase C: The final stage of the project will be a full-scale demonstration of the designed mining system at a selected representative site. The demonstration will serve to both test the system and provide an opportunity to debug and refine the system. The major part of the work is planned to start during the fifth year of the ten-year project and to be completed by the tenth year.

IN SITU RETORTING

Objectives

1. Develop techniques for *in situ* retorting of oil shale that will be applicable to various deposits of Green River oil shale in Colorado, Utah and Wyoming.
2. Correlate these techniques with properties of the deposits to determine the best technique to employ for conditions at any specific location in the area.

Program

A 10-year program is proposed, with provision for later further extension, that will demonstrate the potential of methods for fracturing and retorting Green River oil shale and that will develop additional techniques to supplement or