

# G E O S C I E N C E

## NOTES

### OIL SHALE AN IMPORTANT FUTURE SOURCE OF ENERGY

by

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ABSTRACT

Oil Shale deposits include several kinds of fine-textured sedimentary rock which contain abundant organic matter capable of yielding 10 to 30 or more gallons of oil per ton when heated. Oil shale is a misnomer. It is actually a bituminous marlstone. The rock contains no porosity or permeability. Oil shales are widely distributed in strata of many ages on all continents. The oldest are the Cambrian of Sweden and the youngest occur in Pliocene strata in Burma and Thailand. Large shale oil reserves of Permian age occur in Brazil.

The world's largest oil shale deposits occur in the Green River Formation (Eocene) in northeastern Utah, southwestern Wyoming, and northwestern Colorado, with the richest and best known reserves being located in the Piceance Creek Basin of northwest Colorado.

Colorado shale oil reserves are commonly reported to be about one trillion barrels. This reserve figure is highly unrealistic considering currently known mining and retorting on possible in situ recovery methods. On a more realistic basis the primary Colorado shale oil reserve is about 80 billion barrels and the secondary reserve about 300 billion barrels. Recoverable reserves may be 30 percent less from mining (retention of pillars) crushing, and surface retorting losses. Should an in situ retorting method be developed, however, recoverable reserves may be at least 500 billion barrels of oil because the thick deeper deposits in the northern half of the Piceance Creek Basin can be included.

Oil shale is not a new industry. It dates back to 1838 in France and 1850 in Scotland. Shale oil is currently being produced on a large scale in China and Russia (Estonia), and on a small scale in Spain. Numerous exploitation methods have been developed during fifty years of pilot plan research in the United States. The most common methods include the Downdraft Retort (Union of California), the Gas Combustion Retort (U. S. Bureau of Mines), and the T.O.S.C.O. Process.

Almost every major petroleum company has established an oil shale department with a staff of geologists and engineers and have leased privately owned oil shale of purchased fee acreage.

The Oil Shale Corporation in partnership with Cleveland Cliffs Iron Company and Sohio Petroleum Company have acquired large land-reserves, hold the patent to the most efficient retorting method, have established the most economical mining techniques, and possess the marketing and refining facilities to establish the first commercial U.S. oil shale production. The Oil Shale Corporation's pilot plant is completed to produce about 700 barrels per day from 1,000 tons of oil shale. There is a reluctance, however, to invest an estimated \$100 million for a 50,000 barrels-per-day plant until considerably more scale-up research has been completed and the disposition of Federal oil shale lands has been clarified. Oil shale is commercial now, but the amount of the rate-of-return is uncertain. A bill to equate the depletion allowance for shale oil (currently 15 percent of the mined and crushed rock) with conventional crude oil (27 1/2 percent of liquid petroleum) is buried in Congress. Oil shale by-products include nahcolite (sodium bicarbonate), dawsonite (an important source of aluminum), ammonia, sulphur, and pipe line gas.

Deterrents to an oil shale industry are: a) heavy (highly viscous) oil development; b) tar sands; c) coal hydrogeneration; d) nuclear energy; e) important policy; f) possible large new discoveries of conventional crude oil. Import policy currently has the more sensitive affect on oil shale profitability.

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