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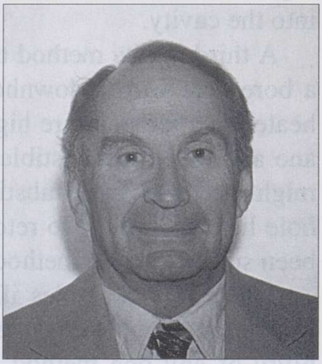
EDITOR'S PAGE

2001: A NEW ERA FOR OIL SHALE DEVELOPMENT



On September 11th, 2001, the United States was attacked by terrorists causing loss of life and destruction of property on an unprecedented scale. In light of this horrific event, one might ask if terrorists could disrupt petroleum supplies from the Middle East, which are crucial to the industrialized western nations. Now may be the time that the energy industry should place greater emphasis on developing alternative energy resources such as oil shale to offset the dependence on Middle East oil.

Although deposits of oil shale are found in many parts of the world, their exploitation has been minimal owing to the high costs of mining and retorting oil shale for transportation fuels. During the 1970s and 1980s attempts were made to establish a viable oil shale industry in the Green River Formation in western US - a resource of 215×10^9 metric tons of in-place shale oil. These attempts did not succeed owing in part to the costly, and essentially obsolete, retorting technologies that were employed. Furthermore, it became apparent that there would be problems of spent shale disposal and potential air and water pollution from mining and processing oil shale that would be unacceptable. Environmental concerns would add significant costs to oil shale operations.

Ideally, the best methods of recovering shale oil and combustible gases from oil shale would be those that would disturb the least amount of overburden, leave the noneconomic gangue minerals in place, achieve the maximum recovery of hydrocarbons, and release the least amount of waste products to the environment. With these objectives in mind, it appears that subsurface methods of recovery of hydrocarbons from oil shale are the most attractive.

Laboratory and field experiments of *in situ* recovery of Green River shale oil were made by industry especially during the 1970s and 1980s, a period of intense oil shale activity in western Colorado. One such method involved drilling a number of shotholes loaded with explosives in an area of oil shale underlain by a thin cover of overburden. The explosives were ignited creating a bed of fragmented oil shale covered by the overburden. Methane injected under mild pressure into a series of bore holes drilled along one side of the area was ignited causing a fire front to progress across the buried zone of oil shale rubble. Another series of holes drilled along the opposite side of the area collected the oil and gas vapors from the retorted oil shale with the overburden acting as a seal.

Another *in situ* technique involved the recovery of shale oil and combustible gases from vertically drilled bore holes. In this method, steam was injected into the bore hole, which retorted nahcolite-bearing oil shale. The steam dissolved the nahcolite to create a vertical cavity some tens of meters high from which shale oil was collected by production bore holes drilled into the cavity.

A third *in situ* method tried in the field included retorting the oil shale in a bore hole with a downhole heater fuelled by methane. The oil shale was heated to a temperature high enough to convert the shale oil vapors to methane and other combustible gases. In place of methane to fuel the heater, it might be feasible to substitute a small nuclear power reactor with a downhole heat exchanger to retort the oil shale. Radio frequency energy has also been suggested as a method of heating oil shale underground.

These few examples illustrate the variety of *in situ* methods that have been used to recover shale oil and combustible gases. The economic feasibility of any one method, of course, would require extensive field testing and pilot plant scale-up. Utilizing such methods, however, could achieve the goals of an ideal oil shale operation as mentioned above. Some of these experimental *in situ* techniques are described in proceedings volumes of oil shale symposia held under the auspices of the University of Kentucky and the Colorado School of Mines.

Forecasts suggest that world oil production will peak within the first quarter of this century. With the added threat of terrorist disruption of Middle East oil supplies, it is imperative that the energy industry and governmental agencies increase research and development of alternative energy resources, including oil shale.

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