oil from oil shale. Today only in the Soviet Union and China is shale oil produced commercially, and there only in small quantities.

Oil shale could be broken up in-place by means of nuclear explosions to create a chimney of fragments of oil shale surrounded by the relatively impermeable shale. This chimney could then be retorted in-place, liberating the shale oil. However, the techniques for in situ retorting have not yet been developed.

Underground nuclear explosions to extract the oil would avoid bringing the shale to the surface. This would minimize disturbance of the natural landscape and should also avoid water pollution and ash disposal problems associated with aboveground methods. Success in this method could lead to the recovery of an oil reserve with a value some have estimated as high as $3 or $4 trillion.

Storage of natural gas in nuclear chimneys

Natural gas fields are often located far from the large consumer markets. Natural gas from these remote fields, if used, must be transported to market by tankships or in long-distance high-pressure pipelines. Under these circumstances considerable effort has usually been expended to accumulate storage facilities near the consumer area to meet peak demands during cold weather.

The major form of gas storage has always been underground in depleted gas or oil fields, but such fields available for storage are growing scarce. The possibility of storing natural gas in the porous and the impermeable rock of nuclear chimneys is now being seriously considered.

Development of mineral resources

Deep underground nuclear explosions for extracting minerals fall into two main categories, in situ leaching of suitable ore bodies and removal of the broken ore by block caving. These methods have greatest potential in large, massive, regularly shaped ore bodies too deeply buried for open-pit mining.

The copper in many large low-grade and small high-grade deposits cannot be recovered economically by conventional methods because recovery