ploring for types of plastics and ceramics that will comprise satisfactory substitutes deserve attention.

The manner in which sheet mica occurs in nature prevents the use of mass mining methods. The necessity of recovering undamaged books of mica and the softness of the material create special rock breaking problems. Domestic production of sheet mica is hampered by high extractive costs due primarily to the requirement of large amounts of costly hand labor. Imported mica can be delivered to a domestic consumer for about half the cost of domestic material. Attempts to replace natural sheet mica with synthetic flake have failed because of the lack of satisfactory bonding techniques.

The growing demand for ground mica has been accompanied by improvements in processing techniques resulting in improved products and lower costs. Also, processing improvements permit a variety of schists and other mica-bearing substances to be now considered as resources. Further development of these techniques promises lower costs and expanded markets.

Molybdenum

In regard to the ores mined primarily for molybdenum, as well as those containing molybdenum as a byproduct, grade tends to decrease and treatment complexity tends to increase with time. Thus mining and beneficiation, specifically flotation, technology will need improvement to preserve the present favorable commercial position of United States resources. Other countries, like Canada are emerging as major suppliers. It is debatable if the United States can retain its position as a net exporter after 1985 without substantial technologic advancement.

Supply presents no problem but recovery is poor (ranging from 40 to 90 percent) from the portion of total domestic production (20–30 percent) derived as a secondary product in the processing of porphyry copper ores.

The molybdenum-rhenium relationship is significant should the supply of the latter prove to be an issue. The only significant source of rhenium is as a coproduct of molybdenite existing, in turn, as a byproduct of selected porphry copper ores. The generally poor recovery of molybdenum from this source plus the fact that the rhenium is not presently recovered at all suggests that beneficiation techniques merit improvement. (See section on rhenium.)

There are essentially no competitive substitutes for molybdenum in its critical alloying applications, but it can substitute for other alloying elements—notably tungsten—to some extent. The relative abundance of molybdenum suggests that inquiries in the broad field of interchangeability among the ferroalloying elements would tend to reduce spot critical supply situations whenever use patterns change.

Reclamation of molybdenum from the increasing volume and more complex superalloys presents a growing problem of materials reuse and secondary metal recovery or disposal. The magnitude of the problem is not immediately measurable in terms of volume or urgency but in view of the technical uncertainties deserves modest attention at an early date.

Natural Gas

As in the case of petroleum, exploration and development activitiy has declined and the ratio of proved reserves to current consumption is trending downward. Improving the incentive for exploration, including cost-cutting technologic advancements, merits attention (see section on petroleum).

Also, as in the case of petroleum, Government policies and actions significantly influence the supply-demand pattern for natural gas.

The practicability of effectively employing gas from sources that have only marginal commercial significance at present deserves attention as a means of vastly improving the reserve position. Such potential sources include gas-bearing measures of low permeability and other formations that contain occluded gas but little or no petroleum.

Growing concern for atmospheric pollution stemming from the employment of high sulfur fuels, notably coal and oil, focuses attention on the relatively low sulfur content of the natural gases now marketed. While distribution limitations restrict imminent wholesale substitution of gas for other energy forms, it seems probable that some substitution may result, the probability and extent resting upon the degree of success realized in the removal or control of sulfur issuing from the other primary energy forms.