

single source of scandium is known. Coincidentally, no important demand has inspired much concern for the poor resource outlook.

Apparently research on potential uses does not always proceed in full appreciation of supply limitations. A large potential market for scandium in the illumination field has been sought which, in turn, has concentrated some attention on developing low-cost separation and purification techniques.

#### SELENIUM

While distributed widely in nature, the mineralogical association of selenium with sulfide minerals of copper, iron, lead, and other metals provides the significant source. At present it is derived domestically as a byproduct of electrolytic copper refining. Demand has not been such as to encourage special efforts toward optimum recovery and less than 60 percent of the selenium available to the United States refiners is recovered. Foreign practice approximately parallels this situation. Given a sustained larger demand and higher prices the losses would be reduced. Also, other potential sources of selenium are present in materials that have not been exploited, such as flue dusts from lead smelters and sulfuric acid plants. While the new uses have significantly increased interest in selenium, particularly in electrical and xerox-type copying devices, potential supply seems adequate to accommodate foreseeable demands. As a relatively plentiful byproduct with useful properties, the opportunities for devising new uses or for substitution for less abundant commodities have not been fully exploited.

#### SILICON

The element is practically limitless and supply is wholly a function of production capacity. The end-use applications of commercial importance attached to the production of ferrosilicon or silicon metal. The demand is governed mostly by the requirement of the ferroalloy and steel industries. Relatively small but important uses have developed in the production of silicone and in the electronic industries. The industries engaged with the production and use of silicon are the largest and most advanced of all, and no particular issues are foreseen in either the supply or the development of new application from the element.

As an abundant, potentially low-cost, commodity, the opportunity for substitution for less abundant or most costly substances is present.

Silicon is consumed in large quantities in the form of silica sand for the manufacture of flat glass, tube glass, optical glass and glass products, foundry sand, plaster sand, and for filter beds in municipal water plants. Produced mainly from sand pits, quartzite and sandstone quarries, the industry is plagued by the same conflict of land use, water and air pollution environmental issues affecting sand and gravel production (see section on sand and gravel).

#### SILVER

Major transitions presently upset traditional supply-demand relationships both in the United States and abroad. Ultimate price levels are the subject of speculation and a variety of conclusions. The majority of interests anticipate that both price and demands will move upward over the short-term occasioning a reappraisal of submarginal sources for commercial feasibility.

A large part of the domestic demand has been accommodated through drafts from U.S. Treasury stocks and metal reclaimed from secondary sources. Primary output from domestic mines, while expanding, satisfied only a fraction of the demand. Only a third of the new silver produced domestically is presently derived from predominantly silver ores; the remainder is recovered incidentally to the production of copper, lead-zinc, and other mixed ores. The latter relationship is of considerable importance in the overall cost of production and should direct attention to the potential commercial feasibility of a variety of marginal substances in which silver occurs in any significant quantity.

Except within selected ore bodies silver does not occur in mixed ores in any fixed ratio to the predominant metals. As present byproduct sources of silver are depleted, there is no assurance that the ratio of silver to other metals will improve or be maintained, even though the production of those metals (e.g., lead-zinc) is greatly expanded. The byproduct silver potential of ores likely to be of commercial interest in the future should be understood in terms of the impact various silver (and other coproduct metals) price levels might have on the feasibility of production.