

application develops only through service tests. For another, the devices, techniques and tools that apply abrasion have a low efficiency. More information on the theory and nature of abrasion might substantially alter traditional material concepts and, more significantly, improve the tools and techniques of applying abrasion. The benefits would accrue to the manufacturing sector through savings at time, labor, materials, and costs.

GERMANIUM

Derived as a minor byproduct of ores mined primarily for copper or zinc the supply is wholly a factor of the production rate of those commodities. The element also occurs in trace amounts in some coals and other substances. A major current supply component is derived from recycled scrap from manufacturing processes. Current supply exceeds demand. Large stocks are accumulated in germanium-enriched refinery residues. Most of the consumption is in the electronics industry and there is strong competition from other substances tending to reduce the germanium share of the market. As in the case of the other minor coproducts of base metal ores, the sale of germanium has only a small effect upon the economics of extracting or producing the primary product. But the sale of refined germanium has been significant enough to occasion considerable industry inquiry into potential new uses and little additional emphasis on this subject is merited.

GOLD

The national interest would be advanced through events that would permit increased domestic primary production of gold at the prevailing statutory price for the metal. Among other factors short-term foreign liabilities are reducing United States Treasury stocks at a rate that threatens statutory reserve requirements.

Because of its monetary relationship and the resulting fixed price and single legal domestic market for gold, the normal commodity supply-demand relationships do not apply. Price is not influenced by costs and, as a result, domestic production except that issuing as a byproduct has declined as costs have increased. Except in a few instances, technologic advances have not effected cost reductions to the extent necessary to permit continued commercial production. In view of the extent of the known resources that are presently non-commercial, the feasibility of new techniques, systems, or concepts that would permit profitable exploitation at the fixed price level invites attention.

Technologic advances in exploration have been effective in recent gold discoveries of commercial significance. In fact, the prospect of finding new sources of gold that will yield to present technology at present price levels is sufficiently attractive to merit a priority of attention. Similarly, such techniques are expected to disclose new large marginal gold sources that might be commercially attractive if modest advances in extraction and processing technology are realized.

Other factors which increase the uncertainty of gold supplies include the fact that gold production abroad was dominated by the Union of South Africa where 65 percent of world output was mined in 1966, but where some uncertainty attaches to future production rates. Although demand abroad for the arts and industry appears to have been relatively small compared with per capita consumption in the United States, there is an enormous but unmeasured disappearance of gold into foreign private hoards.

In the United States, copper and other base metal ores provide substantial amounts by byproduct gold. Byproduct silver is obtained from most gold ores and the recent increases in the price of silver have given some gold mine operators a small lift. Additional emphasis on byproduct production and the development of new techniques to base metal refinery slimes might result in some additions to supply.

Considerable gold is recovered from secondary sources, but the supply could be extended by improvements in salvage practices and techniques. The marine environment promises a new dimension to source concepts if certain capabilities can be developed (see section on nickel).

New primary sources of gold are likely to be low in grade and, if commercially significant, likely to involve large volume mining and major surface disturbance. Major land-use conflicts must be expected and equitably resolved. For example, the importance of placer deposits as a source of production is decreasing because of competitive uses for suitable dredging land.