

the state of development work and the economic conditions prevailing at the time. Existing estimates of domestic lead and zinc reserves thus underestimate the resource base. If the price-cost ratio of the metals increases, domestic production and discovery of domestic reserves will be stimulated. New sources of ore supply would be developed as mining of lower grade ore becomes profitable. It is not known, however, to what extent such developments would augment present domestic production.¹⁵

A growing share of the domestic supply of lead and, to a lesser extent, of zinc, is obtained from scrap. Lead production from scrap in recent years has exceeded mine production. With a steady growth in the stock of lead- or zinc-containing articles from which these metals can be salvaged after use, the increase in secondary production of lead is expected to continue. Recovery of zinc from scrap also may increase.

Another source for lead and zinc is material rejected during the milling or concentration of crude ores, called tailings. The amount of metal thus lost in former years constituted a relatively considerable portion of overall production. Milling methods have improved, however, and less metal is lost in milling than before. Some of the older mining districts, notably the tristate area and the southeast Missouri district, have accumulated large piles of tailings. Their metal content can be extracted with improved methods when prices are favorable.

Lead and zinc are normally the lowest priced nonferrous metals. Lead is strongly entrenched in most of its major uses because of its high suitability to these particular applications. But even lead encounters competition from other materials, and is subject to the influence of technological changes that could make the use of lead less necessary than it now is. Plastics, aluminum, and combinations of the two in certain types of cable sheathing, and nickel and cadmium in storage batteries are among the materials currently being substituted for two important uses of lead.¹⁶

The most important material competing with zinc is aluminum. That competition is significant with regard to the two largest uses of zinc: Products of aluminum sheet may be substituted for galvanized products. Aluminum is also highly competitive with zinc in die-casting. Another possible substitute is titanium, which competes with zinc in pigments, and there is a trend toward increased substitution of magnesium for rolled zinc, in dry-cell batteries and engraving plates.

LABOR COSTS AND EMPLOYMENT SENSITIVITY

The most important single operating expense in lead and zinc mining and milling is labor cost. The cost of labor per ton of ore

¹⁵ Between 1950 and 1952, under the stimulus of high lead and zinc prices and Government encouragement, numerous exploration projects were undertaken both in the United States and in foreign countries. A certain amount of such development work is continued even when prices are temporarily unfavorable.

¹⁶ Tetraethyl lead, the most widely used antiknock additive gasoline, has become the second largest use of lead, after storage batteries. No substitutes seem to be in the offing, and the upward trend in use of lead is expected to continue. Titanium and other pigments, however, are replacing lead in paints; plastics and other materials are replacing it in construction, and new packaging methods and aluminum foil have restricted lead foil to specialized purposes. Lead also is being displaced in insecticides. Concrete and high-density tungsten-copper alloys are used as protective shields against radiation from radioactive substances at the expense of lead, though the alloys are much more costly.