the present rate in the U.S. The total demand - on the basis of the present world population - would be in the neighbourhood of 450,000,000 metric tons per annum. Applying the U.S. experience on the same basis to other metals it is possible to envisage a prospective world demand for

10.9 million metric tons of copper
8.7 million metric tons of aluminum
8.3 million metric tons of lead
6.8 million metric tons of zinc
2480.0 million metric tons of oil

But the population of the world will not remain static and there is no reason to believe that the people of other nations will be satisfied indefinitely with a rate of consumption only one half that of the U.S. to-day. Yet if demand in these proportions should develop, it would, so far as we now can estimate, be greatly beyond the capacity of any known or probable supply.

Increasing scientific knowledge combined with humanity's desire for a decent standard of living, have resulted in the development of many new uses, not only for the common metals, but for those less known and more rare. Among the latter attention is now being centred on uranium as a source of atomic energy but there are also cadmium, calcium, columbium, magnesium, molybdenum, tantalum and titanium. The last of these is still in its experimental stage of production but it possesses such inherent physical qualities as to capture the imagination of metallurgist and manufacturer alike, being as strong as steel with half the weight and with great resistance to corrosion.

Many of the new advances in man's mastery over nature place additional burdens on our metal resources. Air and automotive transportation, electrical refrigeration, air conditioning, radio, television, and rural electrification are all developments which have greatly expanded the demand for metals. The utilization of atomic energy will require vast increases in the production of steel, copper, lead and the rarer metals.

Within the last two decades the metallurgist has sought to improve the quality of metals for manufacturing purposes by the addition of alloying elements to obtain greater strength and other desirable properties. To-day these alloys are virtually made to the order of the manufacturer and designing engineer. As the research metallurgist gains more and more knowledge of the properties of metals, new combinations of properties will be provided by alloys of the future, each one serving some particular need of industry. As this science proceeds the demands for the rarer metals will correspondingly increase. It is here that critical shortages may first appear. For example, in the development of metal alloys to withstand the high temperatures of the jet engine, columbium and cobalt are regarded as essential. Yet these metals are not only rare in the composition of the earth's crust but economic concentrations are exceptionally difficult to find.

Thus it is quite clear that the combination of an increasing population and rising standards of living will place a strain on our metal resources which will almost certainly in the end prove beyond the capacity of man and nature to supply. It remains to be considered what steps can and should be taken in an effort to prepare for this development.