

That question lies close to the center of a complex pattern of foreseeable critical issues—issues to which we not only should, but absolutely must, give immediate attention. How effectively this attention is directed will largely determine the degree to which an adequate, dependable, timely, and efficient flow of mineral materials may be achieved in the year 2000, or at any future time, for that matter.

Before describing these issues I would like to briefly outline how the current study is designed and how certain conclusions emerge from the analyses performed to date.

As an initial step we sought to digest large volumes of factual information relative to the present world availability and flow of mineral raw materials. One product of this undertaking was a series of flow-charts depicting the essential supply-demand relationships for some 80 metals, minerals, and mineral fuels. I think you will find these particularly useful in gaining a broad overview of the components of U.S. mineral supply and consuming sectors. The initial charts display material flows in 1966.

We propose to revise these annually. World production is displayed in each instance and, where exports to the United States are recorded, the form and amounts are apparent. All the important components of U.S. supply are indicated, exports and stocks are explained, and the major consuming sectors to which supplies are committed are shown.

Wherever feasible substances are described in terms of elemental content in preference to the mineral forms in which they are commonly priced, traded, and in some instances, consumed, in current marketing patterns. In other words, the aluminum chart is in terms of the element aluminum, whether or not it involves bauxite, aluminum oxide, or metallic aluminum.

Senator GRUENING. Dr. Hibbard, Senator Allott would like you to explain this chart.

Senator ALLOTT. It is very small on our copy. I think you can explain it in 30 seconds.

Dr. HIBBARD. Here is the aluminum chart. All of the units shown are thousands of short tons of aluminum.

Senator HANSEN. That is 2,000 pounds?

Dr. HIBBARD. 2,000 pounds. The primary source is bauxite, but the figures shown are in terms of the aluminum content of the bauxite which was mined. The sum at the lower left is the total world supply as mined in 1966. And as you can see, there are exchanges among the foreign countries.

For example, we imported aluminum from Canada. While Canada itself produced no aluminum ores, they get their ores from Jamaica, Guyana and Surinam.

Senator ALLOTT. So the dotted lines on your chart in your statement indicate the source lines?

Dr. HIBBARD. Yes sir. This is part of the interaction between these commodities in foreign countries.

The top figure is the U.S. mine production, in terms of aluminum units. The open white lines represent the movement of bauxite. And we mine some and we import some. And this makes up part of our U.S. supply. All of the dotted lines are imports of alumina, the oxide, again expressed in terms of the element. And all of the cross-hatched lines are imports of metal.