

I am not too optimistic about this. But this is one of these new possibilities, and, therefore, we can't ignore it.

Item 6 is stretching material supplies.

Actually this directs emphasis to the subject of recycling. If we could recycle all of the metals and minerals and commodities which we use only temporarily and then discard with obsolete equipment like old automobiles—or like this circuit board with its gold, for example—these items would constitute a substantial source of new supply. We don't really know much about the quantities involved. We are making studies right now to find out.

Senator ALLOTT. Could I ask you a question on that? You indicated, when you showed this scrap circuit board to us a few moments ago, that there were great numbers of these that are just having to be abandoned.

Dr. HIBBARD. You see, what happens, this circuit board is full of components, transistors and resistors, and so forth. This ends up in a surplus store. There is one in Washington, by the way. You can go down there and buy this plate for a quarter. The hams buy the plate and remove all the transistors and resistors, because there may be \$20 worth of them on there. And this is what they want for their circuits. But they don't realize that there is more than a quarter's worth of gold in the board.

Senator ALLOTT. That is what I was going to ask.

Dr. HIBBARD. And so they normally abandon it, they throw it away. We are making a survey in the major cities right now, as part of our next step to find out just how much of this gold electronic scrap is available. It must be very large.

Then we will have to find out if there are ways and means of collecting it.

You know, some of this has shown up in the incinerator fly-ash. We had a study of fly-ash from seven incinerators in this area, and we found gold in that product. Somebody probably bought some of these plates and took off all the transistors and threw the rest in the wastebasket.

The other part of this subject has to do with the design of more durable goods. If we could double the lifespan of refrigerators or automobiles or the things that are made of minerals, this, of course, would measurably reduce our annual requirements for these commodities.

Or if we knew how to synthesize certain materials, we could reduce our concern for certain shortages. All of these approaches would stretch what we have, and make it last longer and go further.

Item 7—and, again, I would like to put the text in the record, but just summarize it by saying, this looks at certain resources that we have a lot of, but don't use extensively. Boron is an example. We have got lots of boron in the United States. If we could find some way of using boron more extensively, this would be an example of employing a good potential.

Oil shale is another one.

We have a superabundance of magnesium, silicon, and many of the common elements in the earth's crust. If we could learn how to use them, that would relieve the situation and provide a basis for vast new industries.