In other words, I believe that by taking the total problem and looking at it on a systems basis, we could come to some kind of a distribution of the work to solve all of the problems involved.

Mr. DADDARIO. You touch on mine drainage for example. Is it possible that there is no solution? Acid drainage occurs naturally in some places. If we come to the conclusion that there is no solution and that pollution from mine drainage is more of a natural phenomena than anything else, should we accept it and explain why it is?

Dr. HIBBARD. No; I believe there is a solution to the problem. At the moment the solutions which are known are very expensive. It would cost, I would say, in the billions of dollars to solve the problem in Pennsylvania alone.

Mr. DADDARIO. But, because this is such a big problem and because it raises such havoc in certain areas, it ought to be known that we are still groping with the problem. We ought not to panic because people are so disturbed about it and spend money only so as to give the appearance that something is being done.

Dr. HIBBARD. I quite agree. This problem can be solved. It can be solved economically, I believe. It is going to require a sensible research and development program. If we approach it in an orderly way, it will be solved.

Mr. DADDARIO. Mr. Chairman?

Chairman MILLER. We look at some of these problems and we see the immediate effect in our own areas. We sometimes overlook them when they don't affect us directly. I'm conscious of the fact that in California when Shasta Dam was built they had to seal off a number of old copper mines. I have often wondered how long the seals of these mines are going to last under heavy heads of water? What will happen if these seals break?

Dr. HIBBARD. I don't know, but it will be very unfortunate.

I have touched briefly before on the solid waste in the junk auto program. I think the two points I would like to emphasize, the extraction processing and utilization of mineral substances frequently is a cause of solid waste. When you think that an ordinary copper ore contains about half a percent of copper—this means that there are only 10 pounds of copper for every 2,000 pounds of ore—you have a large amount of material to dispose of.

The Bureau has been approaching the problem of minimizing or utilizing wastes and has concentrated on areas of improving systems which would reduce the mineral losses and control the volume and location and products finally discarded. It has endeavored also to use waste to fill and support old mine openings.

Again here, the system approach appears to be essential. One example I would like to make is the problem of burning culm banks. These are waste piles from coal mines and consist of slag and debris and some low-grade coal which has been piled out in the dumps. Frequently these have caught fire for various reasons. There are four interrelated problems involved here. One is the air pollution from the smoke of the culm fire. Another is the solid waste disposal of the piles of debris. There is a problem of pollution from the run-off of rain water into the streams, and there is the whole question of trying to conserve the coal in the piles. Therefore, this is a good ex-