

ment can play a role in determining criteria, knowledge of the science to establish criteria, and in participating and improving the operation and design of municipal treatment works, and other similar functions in which there is no industrial role.

The stimulus for research by industry and the private sector is a force whereby your own funds and capitalization can be used to develop new technologies and change your processes to minimize cost. I think these are all very pertinent. Do you find any place where joint sponsorship is desirable between the Federal Government and industry, such as pilot plant operations? Let that be a question for the record rather than one to be answered here.

(The reply to this question may be found in vol. II.)

Mr. DADDARIO. Yes, because we do have another witness, and we are running out of time, so if you could keep what you want to say short, Mr. Logan.

Mr. LOGAN. Mr. Chairman, we have not talked much and none of the questions have borne on the hazard of toxicity. I wonder if Dr. Zapp could comment on that.

Mr. DADDARIO. Mr. Bell has a question first.

Mr. BELL. Mr. Logan, being from Los Angeles, my questions will be on air pollution. From a technical viewpoint do you honestly feel that existing air pollution research in chemical plants has been adequate enough to reach an understanding about the effect it will have on human beings?

Mr. LOGAN. I can't answer your questions specifically. I think Dr. Zapp is going to comment on this type of thing. In general we find that the people who work in our plants are less subject to hazards than when they get home and out on the streets. This leads us to believe that there is a technology here that if applied broadly could drastically improve the situation. We can take care of our people as long as they are under our control. It is when they get out on the streets and get home is when they are in trouble. And, this comes back to knowing more about what are the critical limits that people can be exposed to and what is the degree of hazard and maybe Dr. Zapp can take 1 minute and then we will move on.

Mr. BELL. Do you want to comment on this?

Dr. ZAPP. I will, sir. This is not a prepared statement and I will try to make it very brief but I think what Mr. Logan is getting at is that the toxicologist, which is one who is concerned with the toxic actions of materials, is concerned with two things: With toxicology itself, or the toxicity of material, which is the inherent ability to produce injury or death; and also is concerned with hazard, which is the probability that injury will occur under a given set of circumstances of use.

In the chemical industry we deal with chemicals of all grades of toxicity, from the extremely toxic to the practically nontoxic. We handle the extremely toxic materials with the hazard in mind; that is, can we do it under such circumstances that the probability of injury will be very little? We set criteria which are applicable for the, say the atmospheric concentration of chemicals in the atmosphere. Now, these are not zero, and experience has indicated that it is not necessary, or perhaps even desirable to get them entirely out of the air.