

oxides which are produced from air at the temperatures in the cylinders.

If you look at all of these variables, you can then model a system and balance the input and the information output variables. From this we can learn what must be done in terms of the functional design of an engine or of fuels utilization devices to avoid these specific compounds which are harmful to health.

And, I think from that approach you might end up designing the fuel or designing the fuel utilization system and designing an effluent control system which might well do the job of the existing internal combustion engine and may or may not look like it.

To proceed with the next question, B(1), which asks whether or not research on pollution abatement sponsored by the private sector of the economy can be stimulated and can do the job. Basic research on pollution of all kinds has not usually been heavily supported by industry inasmuch as the benefits that may accrue frequently can't be applied solely to the organization supporting the research and the monetary benefits and returns are not particularly rewarding.

In general, this is known as nonproductive research. For this reason the Government will doubtless have to play a dominant role in pollution research, and institutions of higher learning in cooperation with the Federal agencies can make valuable contributions.

In this connection, I would like to point out that air pollution is an international problem, and we are attempting to keep abreast of technology as it develops in laboratories throughout the world. The Interior Department has a working agreement with the Japanese Government on the development of natural resources, and Mr. Perry of my staff is chairman of the American panel on air pollution. This panel has met with their Japanese counterparts both in Japan and in the United States, and the results are most encouraging. Secretary Udall, accompanied by several pollution experts, recently visited Germany and a return visit by German investigators is being arranged for this fall. The possibility for cooperative research between the two countries is being explored at the present time. Likewise, close liaison between our officials and the British is providing a rapid exchange of information on all facets of the air pollution problem.

Since the private sector is responsive to competitive factors and the setting by the Federal Government of new standards would tend to disturb existing markets, industry undoubtedly would make strong research efforts to meet Federal standards in order to retain its market strength if these economic implications were applied.

With respect to question B(4), the Bureau of Mines does not have authority to contract with outside agencies.

Mr. DADDARIO. Mr. Vivian, would you like to ask a question?

Mr. VIVIAN. I was following your prepared testimony, and I noted you omitted the fact that the Bureau of Mines does not have the authority to contract with universities in most of its research areas.

Dr. HIBBARD. That is correct, sir.

Mr. VIVIAN. What is the nature of the restriction?

Dr. HIBBARD. We have authority to contract in the area of solid waste disposal and in the area of our helium activity. In all other activities we do not have such authority.