so, I would like to briefly describe some of our projects in this area, and discuss some medical research opportunities for the future.

While the medical community—and the API—is well aware of the physical damage which can be caused by high concentrations of air pollutants, such as have occurred in Donora, Pennslyvania, and in London, it is sorely lacking in data concerning the long-term, low-dosage effects of breathing the air in our environment. Our medical research has therefore been directed toward both of these areas.

Episodes are rare, as you know. But medical experts agree that in the few episodes that have occurred around the world, sulfur oxides, in combination with other pollutants, have beyond question played a role. While awaiting a breakthrough on reduction of sulfur oxide emissions through either desulfurization of oil or removal of sulfur oxides from stack gases, API feels that attention must be directed toward the prevention of future "episodes."

Sulfur dioxide, when inhaled as a single pollutant in ambient air, is largely filtered out of the respiratory tract in the mouth, nose and throat. But under episode conditions, with high levels of many pollutants in the air, significant amounts of sulfur oxides can get down into the lungs. This happens because sulfur oxides are absorbed onto particulate matter which has also undergone a buildup. When breathed deeply, extremely small particulates with adsorbed sulfur compounds are carried into the respiratory tract. In unusual concentration, this combination can have a significant effect.

API has made a study of past episodes and determined that if certain levels of these two pollutants, in combination, can be avodied, an episode probably would never occur. We would like to submit for the record a short paper on how this might be accomplished, written on behalf of the oil industry and read in June before the Air Pollution Control Association by Curtis G. Cortelyou of Mobil Oil Corporation.

The engineering firm of Jackson and Moreland is now conducting an API-sponsored study in New York City to determine the feasibility, cost, and effectiveness of the plan we propose.

A similar study, also sponsored by API, and directed toward the prediction and prevention of episodes, and carried out by New York University, involves the evaluation of air monitoring methods and meteorological forecasting in the New York metropolitan area.

I mentioned medical research inadequacies about the effects of long-term, low-dosage effects of breathing the air in our environment. Very few such large-scale epidemiological studies have been undertaken because of their high cost and incorporation of so many variables, including sub-standard food, housing, and clothing. I have attempted to summarize the history of such studies in a paper published in the Journal of Occupational Medicine in 1964 and I would, with your permission, like to enter a copy of this paper in the record.

To remedy to some extent the lack of information about long-term effects of air pollutants on our population, the API is now preparing to participate in a continuing epidemiological and clinical survey now being conducted in Chicago. The purpose of this study is to document the possible chronic and/or acute health effects of sulfur oxides and particulates by correlating clinical data from health agencies with changing levels of these pollutants. This program, which will require an acceptable air monitoring system, will hopefully be carried out in conjunction with the Air Quality Standards Committee which serves the Department of Air Pollution Control of the City of Chicago.

Another related project involves the exposure of laboratory animals to controlled atmospheres. This project, too, is designed to determine the possible effects of chronic long-term, low-dosage exposure to polluted atmospheres. The materials to be studied include sulfur dioxide and nitrogen oxides, and particulates, in various combinations. This particular project is being carried out by the Industrial Hygiene Foundation, while another project quite similar to this is being sponsored by the API at the University of North Carolina.

A number of research projects in which the petroleum industry is participating involve the study of lead in the environment.

One project will conduct medical studies that may detect the sub-clinical effects of lead in man, or the effects of lead, if any, on well-established clinical conditions—such as respiratory diseases.

For a severe test of lead effects, we are also sponsoring a project that will feed laboratory animals amounts of lead far above levels normally encountered, for a long period of time. This study is budgeted at $250,000 and will be conducted by Hazleton Laboratories.