

been termed an "air shed" program, with the air shed encompassing all pollution sources in an area and all communities exposed to the air polluted by these sources. The control program for a particular air shed is developed rationally. Standards of air quality are selected; from this baseline and from data on the natural characteristics of the area, standards for emissions from different sources are calculated; and on the basis of these emission limitations construction and process codes are developed.

This approach is attractive and apparently simple. However, certain fundamental problems must be solved before the approach can be fully implemented.

The first of these is social. Air quality standards, if they are to be broadly applied, have to be acceptable not only to the scientists who must devise the means of achieving them, but must be acceptable to the public, who in the long run must pay for the benefits derived from their application. I do not believe, Mr. Chairman, that there is any question in anyone's mind but that air quality standards should be vigorous enough to prevent adverse health effects in even the most sensitive of the human population. I believe that most of us would also want standards sufficiently vigorous to prevent sensory irritation, injury to animals, and damage to ornamental plants or agricultural crops. However, while it has been amply demonstrated that air pollution at levels routinely found in community atmospheres is associated with these adverse effects on health and welfare, there is a vast amount of research that must be conducted before we reach, if we ever reach, a perfect understanding of the cause-and-effect relationships between air pollution and the damage we now observe.

Let me at this point, Mr. Chairman, identify some of the more important areas in which we need to expand our knowledge of the effects of air pollution. I will limit myself to the effects of air pollution on health.

A principal objective for research both now and in the future is to establish the cause-and-effect relationship between known dosages of air pollutants, singly or in combination, and the health or welfare of man under known environmental conditions. This will require the acquisition of new information at all levels, from basic research to field investigation.

The basic mechanisms of action of many agents are ill-defined or unknown, and we must understand them if we are to define capacities for physiologic and toxicologic actions.

As you know, Mr. Chairman, in the Clean Air Act the Congress recognized the need for yardsticks of air quality, calling upon the Secretary to publish criteria reflecting the latest scientific knowledge of the predictable effects of various pollutants in the atmosphere. This Department has prepared in preliminary form criteria for two principal classes of pollutants, the sulfur oxides and the photochemical oxidants, and is working on criteria for two other classes, the nitrogen oxides and carbon monoxide. It is hoped that these criteria will assist the States and local governments in establishing air quality standards.

The second problem we must solve if we are to apply the rational approach to air pollution control is technical. We do not have today