OTHER AIR POLLUTANTS

The pollutants I have discussed are receiving primary attention at the present time. Moreover, many other materials entering the atmosphere as a result of industrial operations may require abatement action soon. These pollutants include: oxides of nitrogen and carbon; trace metallic substances and compounds from combustion of fossil fuels and metallurgical operations; polynuclear hydrocarbons in waste combustion gases; fluorides from fertilizer plants; miscellaneous dusts from mining and industrial operations; and obnoxious odors. Unfortunately, methods for removing some of these industrial wastes are unknown, while for others, studies on engineering technology are just starting. Of the pollutants specifically mentioned, oxides of nitrogen are of special importance at present because they participate in the photochemical smog-formation reaction. Further, on a very long-range basis, even the increase in concentration of carbon dioxide in the atmosphere may need to be controlled if a major change in the earth's weather pattern is to be avoided.

ACID MINE WATER POLLUTION

Acid mine water drainage is an important source of pollution for which no universally satisfactory engineering solution has yet been devised. Some scientific information has been acquired with respect to the method of acid formation in mine atmospheres and a number of engineering solutions have been proposed. Unfortunately, none of these proposed solutions has proved completely satisfactory under field conditions.

Both active and abandoned mines are potential sources of pollutants which can effectively ruin the quality of nearby water supplies. This is a particularly serious problem in the Appalachian coal fields where it has been found impossible to successfully seal off many abandoned mines. Much additional development work will be required before this problem will be resolved. It is clear that the development of adequate technology will be extremely difficult.

In cooperation with other agencies in Interior, (Geological Survey, Bureau of Sport Fisheries and Wildlife, Office of Saline Water, and the recently transferred Federal Water Pollution Control Administration), the Bureau of Mines is directing its engineering knowledge to demonstrating the effectiveness and cost of known methods for acid mine drainage control. At the same time, research and experimentation are being conducted on the causative factors for acid water formation in old abandoned mines, currently operating mines, and future mining operations. Methods investigated include new air-sealing techniques, purification by reverse osmosis, neutralization and chemical reactions, in the hope of finding ways to prevent or abate this kind of stream pollution.

As far back as 1924, the Bureau of Mines recognized a need for research in this area and started one of the first programs in the United States designed to develop fundamental information on the formation of acid in coal mines. In 1933 our people participated in an extensive mine sealing program initiated by the Federal Government as a Works Progress Administration and Civil Works Administration project. However, Federal support and interest in the problem waned, and a continuous research effort directed to an acceptable solution became impossible. Now that the public has become more aware of the needs for water quantity and quality—water for industrial and domestic consumption and for recreational aesthetic purposes has made the problem one of national concern—and support for necessary research has therefore been manifested.

The problem of acid mine water stems from both past and current methods of mining and from subsequent water drainage in geologic settings conducive to acid formation. Any mine may be a source of acid water, but the problem is concentrated in the eastern coal mining regions. Acid mine drainage may be classified as originating from three major sources: (1) deep mines, (2) strip mines, and (3) refuse piles. Deep mines may be further classified as below drainage and above drainage. The immediate problem centers on strip mines and abandoned mines above drainage level.

We know enough today to prevent acid mine water drainage from so-called open pit mines. The same is true for abandoned strip mines if provisions are made for proper reclamation, recontouring and water diversion. The problem is essentially one of cost and not technology.

Deep mines present a different story, because most of the acid draining into streams comes from abandoned underground mines above drainage. Present technology is inadequate to correct this situation. This is worthy of emphasis, for