

it is a common misconception that strip mines are the chief offenders in this matter. They are not; they contribute only an estimated 10 to 25 percent of the present acid water volume. There are an estimated 8,000 abandoned underground mines with a surface area involving in the neighborhood of about 8,000 square miles. Any rehabilitation effort will therefore require a massive effort.

The Bureau's acid mine water program is directed to investigation of the available technology and demonstration of its effectiveness and the economics involved in its application to the immediate problems. This is being done through cooperation with Federal and State agencies by active demonstration projects on selected drainage areas where acid water pollution is a major problem. The program includes premonitoring conditions at the site, construction of remedial measures and post monitoring to determine effectiveness of the installed remedies.

To guide future action, we also are engaged in research to arrive at a better understanding of the principles involved. Our research includes a limited amount of laboratory investigations on the physical, chemical and bacteriological actions involved in acid water formation in mines and a field investigation (under carefully monitored conditions) of special sealing techniques related to mine conditions. This should serve to resolve much of the controversy surrounding the effectiveness and value of mine sealing.

The present research effort is not adequate, relative to the seriousness of the problem and the time in which we should obtain a solution. Expanded research in the following areas is necessary:

1. Mine hydrology, drainage and pumping research that will provide a guide to engineered designing of mine systems that would prevent formation of acid mine water.
2. Techniques of eliminating or controlling ground subsidence so as to eliminate surface fractures which permit water entry.
3. Discovery or development of an applied, multipurpose coating that would provide a sealant for underground mine surface areas that would also be a dust inhibitor and have ground support capability.
4. Develop the criteria for methods to divert, contain or direct underground water flow to eliminate inflow to mine openings.
5. Continue and expand laboratory and field investigations on the formation of acid mine water.
6. Development of improved and new mining systems to minimize acid water formation.

SOLID WASTES

The disposal, control, and reclamation of waste products resulting from the extraction, processing, and utilization of mineral substances are important technologic and economic factors in the effective conservation of mineral resources. The Bureau of Mines has for many years approached the problem of minimizing or utilizing waste from the standpoint of conservation. Specifically, it has concentrated on areas where improved recovery systems would reduce mineral losses and, incidentally, reduce the volume of the products finally discarded, and has endeavored to develop methods to recover valuable metals and minerals from various types of waste.

A major aspect of our research program on mining methods is the development of mining systems that minimize minerals waste and, wherever possible, utilize waste to fill and support mine openings. In this way, with proper planning in advance of mining, operators can minimize the wastes that need to be disposed of and can avoid the restoration work that is so often required at existing operations.

The economic utilization of certain types of metallic scrap, such as automobile bodies, poses a problem which is becoming acute. Changes in the technology of iron- and steel-making have made this type of scrap less desirable for reuse than it formerly was. Approximately 6 million automobiles were scrapped last year and approximately 20 percent of these joined the 25 to 40 million old automobiles rusting away in auto graveyards, dumps, vacant lots and roadsides. The Bureau is concentrating much of its research in the field of solid waste recovery to the development of the new technology necessary to allow the economic reuse of the millions of tons of ferrous and nonferrous metals contained in these old automobiles.

One Bureau-developed process, which has been successfully tested on a small scale, and which will soon be demonstrated in a large plant, will utilize both mining wastes and automobile scrap to make a high-grade iron ore for the use of industry. In this process, non-magnetic taconite, and abundant, presently use-