study of the Tradewater River Basin, (U.S.G.S. Professional Paper 575–A, p. A30, 1967). This information is contrary to that obtained by the same Federal agency in its study of the Beaver Creek Watershed in eastern Kentucky (U.S.G.S. Professional Papers 475–A and B, 1963 and 1964), and which had been quoted by others as widely applicable—a sacred cow. This illustration shows graphically what mining men have known for some time and what hydrologists have come to realize—that the hydrology of the surface-mining process in different topographic and geologic regions will likewise be different; accordingly, laws and regulations must take this variability into account.

The other sacred cow has to do with the quality of water produced in the surface-mining process.

Although we all recognize that acid-mine drainage is coming from surface-mined areas, it has many sources—such as old shaft mines, mine-haulage roads, and old mine-waste piles—and need not be caused by the present surface-mining process if recommendations of both the coal industry and the State regulatory agencies are followed. Nevertheless, acid-mine drainage exists and its causes can be isolated by careful study.

However, mere generalizations are not enough. The quantity of acid load calculated for a stream, when based on inadequate sampling, is not only highly erroneous but causes us to adopt unwarranted and ineffectual means of remedying the problem. It has been common practice by regulatory agencies to compute acid loads from mean-daily discharges when available (U.S.G.S. records provide this information for many gaging stations in surface-mined areas), or from even more general data, such as mean-monthly or even mean-annual discharges.

The woeful inadequacy of such data is amply documented in a second report being written now by Mr. Corbett and myself, concerning an Indiana University research project that is an excellent example of voluntary cooperation of industry and several Federal and State agencies. The Busseron Creek Watershed, in western Indiana, is a small-watershed project of the U.S. Soil Conservation Service. Because its 26 projected flood-control structures are in an area that contains underground mines, part having been surface mined and part now being re-mined, and part probably will not be mined, it is a natural laboratory to study and evaluate the effects of surface-mining activity on a small-watershed project.

Mr. Kenneth Grant, then S.C.S. State Conservationist for Indiana, saw the possible application of this study to other small-watershed projects in areas of surface mining, and his agency provided funds to construct and install six stream-gaging stations in the watershed by the U.S. Geological Survey. These stations became part of the network of the U.S.G.S.-Indiana Department of Natural Resources cooperative water-resources program, and yearly operation-and-maintenance costs are being paid therefrom. Mr. Max Noecker, Chief of the Evansville Field Station of the F.W.P.C.A., accepted the challenge of obtaining such closely controlled data to supplement his agency's studies, and his group has made countless sample runs and has analyzed their samples together with many more that have been provided by Indiana University personnel; many of the sample runs were made jointly, and numerous conferences regarding the relationship between quantity and quality have been held, resulting in close cooperation and in the acquisition and interpretation of a huge amount of data. The Indiana State Board of Health, though with limited funds for such work, has shared in some of the sampling and analytical efforts. And just as important, the three mining companies that are supporting our research—Ayrshire Collieries Corporation, Enos Mining Corporation, and Peabody Coal Company—have willingly permitted their personnel to work with us in identifying chemical problem areas and have supplied much critical information.

With this natural laboratory of the Busseron Creek Watershed, we have learned several things that cast a cloud over some of our cherished beliefs; four of these are cited in the paragraphs that follow:

1. Impoundment of acid waters in permanent-pool reservoirs may provide no relief from acid-mine drainage downstream. In fact, during periods of no flow, which are common in late Summer or early Fall, downstream acid conditions may be aggravated by the impact of flash-flood runoff into the reservoir that could stir-up the stored water.

2. In an acid-producing area, acid water is not discharged from all mines; by careful study the offenders can be isolated from the good thus permitting better reclamation efforts.

3. In a watershed that contains acid water, some areas of surface mining do not produce acid and can be isolated; in fact, if the discharge of this good-quality