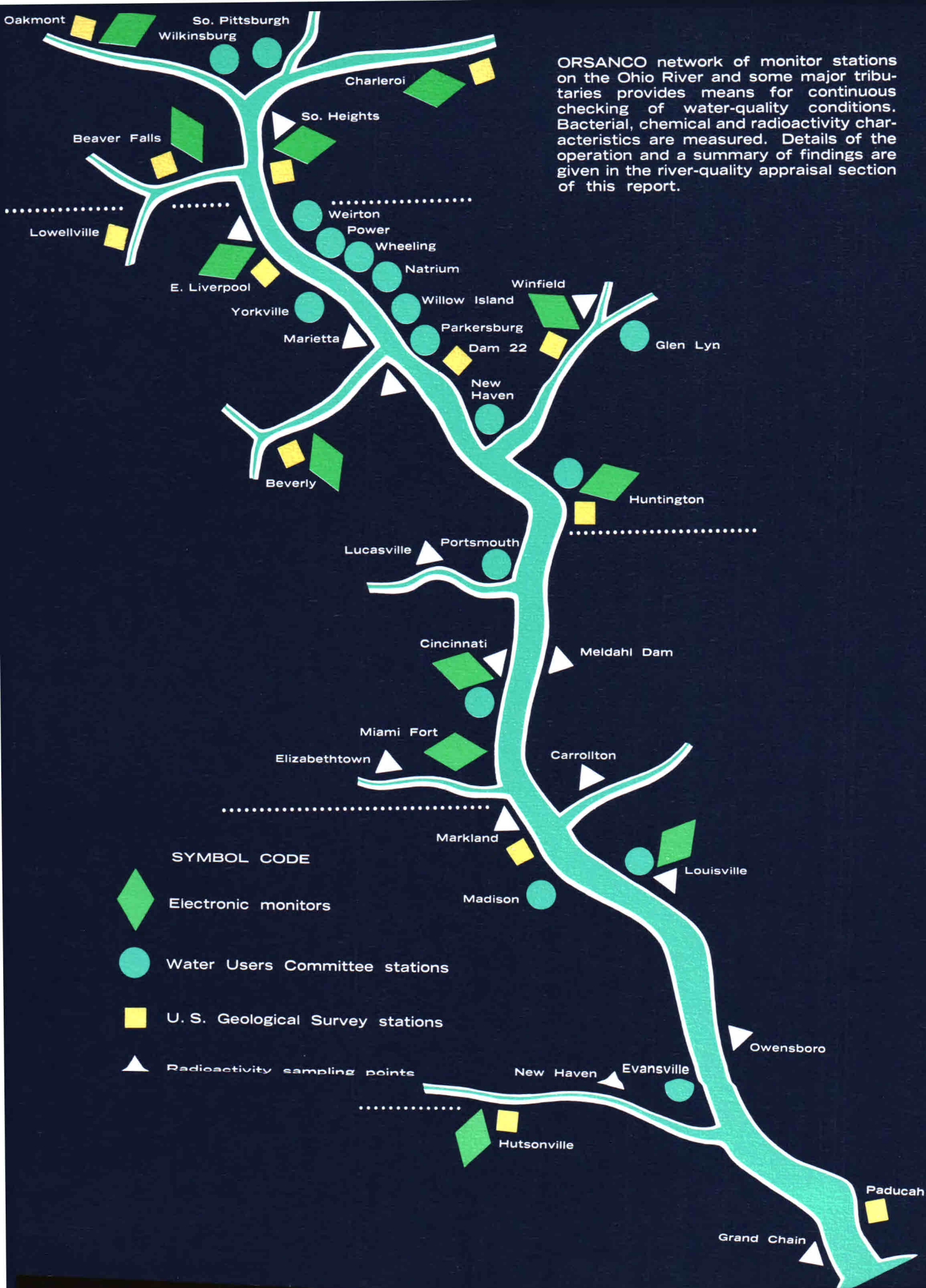


ORSANCO



1964

ORSANCO network of monitor stations on the Ohio River and some major tributaries provides means for continuous checking of water-quality conditions. Bacterial, chemical and radioactivity characteristics are measured. Details of the operation and a summary of findings are given in the river-quality appraisal section of this report.



The Commissioners of the

**OHIO RIVER VALLEY
WATER SANITATION
COMMISSION**

an interstate compact agency
created jointly by the

State of Illinois

State of Indiana

Commonwealth of Kentucky

State of New York

Commonwealth of Pennsylvania

Commonwealth of Virginia

State of West Virginia

State of Ohio

with approval of
the Congress of the United States

respectfully submit their

**SIXTEENTH
ANNUAL REPORT
1964**



SIXTEEN EVENTFUL YEARS



Today, 99 percent of the sewage emanating from communities along the 1,000 miles of the Ohio River is piped into purification plants. Sixteen years ago all of this effluvia was poured untreated into the river. To visualize what these treatment facilities are handling in terms of quantity, here is a comparison: If this sewage flow had to be conveyed away in railroad tank cars for disposal, it would require a train 350 miles in length every day.

Matching this progress in clean-up efforts on the main stem of the river has been the installation of sewage-treatment facilities on tributaries of the Ohio. Throughout the entire drainage district there are now more than 1,300 communities — with a total population of 10,700,000 — provided with purification plants. What this means is that 94 out of every hundred persons connected to a sewer system in the Ohio Valley has made an investment in pollution abatement. How much? The total is about one billion dollars — averaging \$100 for every man, woman and child!

Another goal of this regionally coordinated crusade for clean streams initiated in 1948 by eight states has been the curbing of industrial-waste pollution. There are more than 1,700 industrial establishments whose effluents are discharged directly into streams of the Ohio Valley district. Today, 90 percent are recorded as complying at least with minimum interstate requirements — and some are rated as doing even better.

These are the salient facts that emerge from the 16th annual inventory of pollution control compiled by the member states of the Ohio River Valley Water Sanitation Commission, sometimes known as ORSANCO. These states are pledged by a compact, approved by the Congress of the United States, “faithfully to cooperate in the control of future pollution in, and the abatement of existing pollution from, the waters of the Ohio River Valley.”

The record eloquently testifies to the manner in which this pledge is being honored. And one of the signatories to the compact — the State of Illinois — proudly reported this year to its sister states that all of its sewered municipalities along the Ohio River had now completed installation of treatment works. Thus, efforts of the Sanitary Water Board of Illinois have given that state the distinction of being the first to achieve 100 percent compliance with a major goal of the interstate agreement.

In pursuit of their self-inspired mission, the states are under no illusion, however, that the great strides forward in stream clean-up permit any slackening of pace. Their inventory also reveals that achievement in promoting control of remaining sources of untreated waste discharge is somewhat short of aspirations. Currently they are concerned with obtaining construction timetables from 372 communities and 172 industries that have not yet complied with requirements. Most of these represent relatively minor sources of pollution and many are catalogued as “hardship” cases. Nevertheless, in the long-range plan adopted by the Commission it was contemplated that schedules for all delinquents should be established not later than 1965. This is one of the goals toward which the states are working.

Perhaps of even greater concern is how to cope with the increasing burden of inspection of new treatment facilities. Each year the number of plants increases. And today there are some 1,300 municipal installations and 1,600 industrial control works whose operation lays claim for periodic inspection. Budgetary and other constraints on staffing have always imposed handicaps on state regulatory agencies in handling this task. Meantime, evidence of faulty operation of facilities is accumulating and with it the recognition that this may deny full realization of clean-stream benefits that should accrue from the construction investments already made.

The Commission is exploring ways to deal with the necessities for inspection. But as one commissioner philosophically observed: “Had the states been less effective in getting treatment plants built we wouldn’t have this problem to face. It’s like the traffic situation — the more roads you build the more policemen you need to patrol them.”

Supplementing the multitudinous duties carried out by the signatory states in advancing pollution control within their individual jurisdictions are activities of mutual regional interest that have been assigned to the staff of the Commission. Of paramount importance, and growing more so since its establishment in 1951, is the ORSANCO river-quality monitor network. Coupled with this basic service is the conduct of an interstate hazard-alert program to deal with accidental spills, and the performance of aerial surveillance of river conditions.

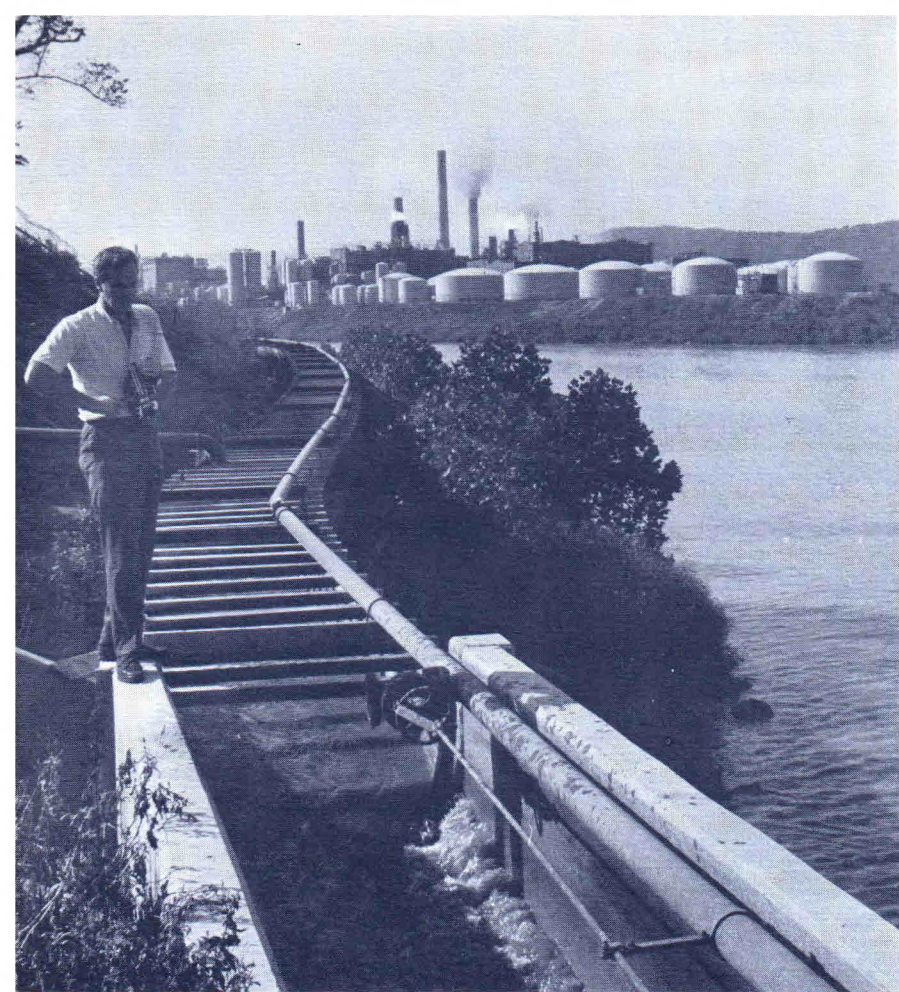
Other undertakings assigned to the Commission staff include administration of advisory-committee relationships, execution of public-affairs activity, development of documentary films and participation in federal-state water-resources planning.

Details on these activities and related matters are summarized in the following pages. In addition, one section of the report is devoted to a resumé of river-quality measurements and their significance.

RIVER QUALITY APPRAISAL

Thirteen years ago ORSANCO inaugurated the practice of systematically compiling and evaluating changes in river quality at various places throughout the valley. Initially, data assembly was facilitated by enlisting the aid of managers at municipal waterworks and industrial intakes. Soon thereafter a cooperatively-financed contract was made with the U. S. Geological Survey to supplement this service. Today, this manually operated component of the monitor network provides quality data from 38 locations in the Ohio Valley.

Meanwhile, the ORSANCO staff envisioned possibilities of developing an automatic system for maintaining 24-hour-a-day vigilance on river-quality variations. The commissioners supported this notion by authorizing a modest outlay of funds. Four years ago the idea became a reality. In September 1960, the ORSANCO ROBOT MONITOR system was placed in operation and thus introduced both the concept of continuous monitoring as well as the “hardware” for doing it.



Progress in cleanup of the Kanawha River in West Virginia is symbolized in this view of a shoreline conduit collecting chemical wastes from a vast industrial operation. The waste waters are conveyed to a treatment plant for cleansing prior to discharge into the river.

The ORSANCO electronic-sentinel system consists of multiple sensor units, telemetry equipment and transcribers for read-out of results directly on typewriter and punched tape. Eight of these units are connected by leased-wire circuits with headquarters in Cincinnati; four others are equipped with on-site recorders. Six of the monitors are situated on the Ohio River main stem, and six are located on tributaries. Every hour on the hour an automatic timer activates the transmitter stations, which then report on river conditions.

While developing the tools to automate the acquisition of quality data, staff attention was also directed to satisfying a subsidiary requisite for diagnosing the behavior of rivers — namely, securing daily information on quantity and velocity of flow. Enlisted in this endeavor were the capabilities of the U. S. Weather Bureau. At Cincinnati the bureau maintains a River Forecast Center whose activities were primarily oriented to the prediction of floods. By adaptation of techniques employed for this service the U. S. Weather Bureau has made it possible to furnish ORSANCO each morning with a measure of the flow

for that day as well as a forecast of expected conditions for the next three days at selected points on the Ohio River and some of its tributaries. This is a unique and invaluable service that paves the way for regional water-quality management. Among other things it permits the ORSANCO staff to evaluate the influence of spills immediately, and to develop knowledge on correlating quality changes with flow variations.

To facilitate appraisal of the data being compiled — which averages some 47,000 items monthly — a program for electronic computer processing has been devised. Some of the findings from this array of information on river conditions, and an interpretation of its significance to the interstate pollution-control efforts, are given in this report beginning on page 16.

Aside from the current usefulness of the river-quality evaluation project, the undertaking may be regarded as significant for future conduct of pollution-control endeavors. It is providing a demonstration of the application of new tools and techniques for the management of water quality, which at present is a concept rather than a practice.

MONONGAHELA RIVER CONFERENCE

On December 17-18, 1963, the Secretary of the federal Department of Health, Education and Welfare called a conference in Pittsburgh with representatives of the Ohio River Valley Water Sanitation Commission and the States of Pennsylvania, West Virginia and Maryland with respect to pollution control in the Monongahela River Basin. The conference technique, as conceived by its supporters when it was included in the Federal Water Pollution Control Act, was intended to provide an administrative procedure to expedite consultation and coordination among state and federal interests. However, it is being employed by the federal authorities within the framework of a formal proceeding conducted as a public hearing rather than a conference.

The commissioners of ORSANCO were puzzled why the Ohio Valley was selected as a locale for such a proceeding at a time when the federal agency apparently was burdened with pollution problems in many other parts of the nation where interstate compacts do not exist for their resolution. In brief, the commissioners concluded that whatever the motive for this action, it could not be construed as favorably disposed to the encouragement of interstate-compact relationships. Their views were summarized in a formal statement by Chairman Joseph R. Shaw who said, in part:

“If there is any reason for the Secretary of the Department of Health, Education and Welfare to feel uninformed or dissatisfied with any aspect of the Ohio Valley program, why was this not disclosed at a regular meeting of the Commission? The Department has its own representative — in the person of the Surgeon General of the Public Health Service — serving as a member of this Commission. The Surgeon General or his representative has participated in meetings of ORSANCO since its organization 15 years ago, and has had a voice in development of the interstate program.

“In calling this conference, the Acting Secretary of the Department of Health, Education and Welfare, in a letter dated October 14, 1963, wrote as follows:

‘The purpose of the conference, as specified by Section 8 (c) (3) of the Federal Water Pollu-

tion Control Act, is to consider the occurrence of pollution of interstate waters subject to abatement under the Act; the adequacy of measures taken toward abatement of the pollution; and the nature of delays, if any, being encountered in abating pollution.’

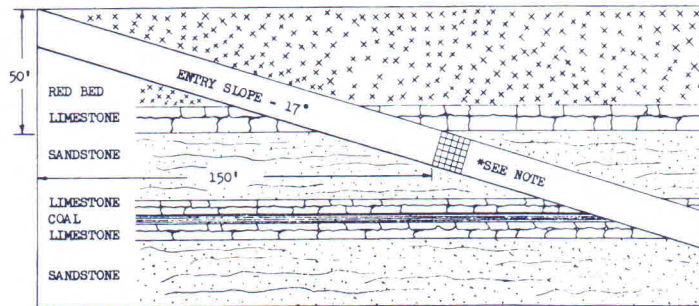
“These items of consideration,” said Chairman Shaw, “insofar as they relate to waters within the Ohio Valley district, are documented in the minutes and records of ORSANCO and in annual reports prepared for the Governors of the signatory states. Such information is — and always has been — readily available to the Department of Health, Education and Welfare through its own representative on the Commission.

“It is difficult to understand, therefore, why the Department has not availed itself of these well-established channels of communication and the meetings conducted regularly by the Commission, to express its interests. The fact that the Department has chosen not to exercise its prerogatives under the interstate compact — a course of action that seems inconsistent with the declared policy of Congress — is the greatest single source of confusion that enshrouds these proceedings.”

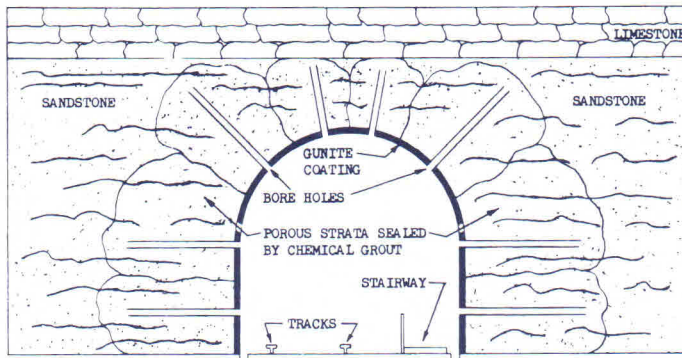
Presentation of statements and reports at the Monongahela conference were conducted in open forum and occupied almost two days. Following this the conferees, representing ORSANCO, Pennsylvania, West Virginia, Maryland and the Department of Health, Education and Welfare, unanimously agreed on the following conclusions and recommendations:

- Pollution of an interstate nature exists in the Monongahela River Basin which adversely affects municipal and industrial water supplies, fish and wildlife, and recreation, such as fishing, boating, swimming, and navigation.
- The States of West Virginia, Pennsylvania, Maryland and the Ohio River Valley Water Sanitation Commission have made appreciable progress in water pollution abatement and have presented acceptable programs for the control of industrial and municipal wastes.
- Cognizance is taken of Pennsylvania’s program to abate pollution from such sources by the end of 1966. Commensurate programs have been developed by West Virginia and Maryland. It is recog-

A CASE HISTORY OF CONTROL OF ACID MINE-DRAINAGE
from the ORSANCO Coal Industry Advisory Committee handbook



Side view — entry slope



Front view — 150 feet down entry slope

**CHEMICAL GROUTING
 TO PREVENT INFLOW
 OF WATER**

The hatched area shown in side view indicates where excessive water seepage occurred. The front view diagram provides details on chemical grouting.

Mining Method: Underground Mining. **Location:** Western Pennsylvania, Upper Freeport Seam.

Results Achieved: Inflow of water into mine stopped. This in turn eliminated severe icing conditions on the walls and ceiling of the mine slope near the entry. This resulted in improved safety conditions and in substantial savings in time and material. The method would be useful to control mine drainage.

Description: Water leakage occurred along the plane of intersection of the mine entry with water-bearing strata. Holes were drilled in the roof and ribs of the entry. First, water containing Calcocid Uranine dye, a fluorescent yellow-green color, was pumped into these holes to locate the leakage; then chemical grout was pumped into the holes to seal off the water.

No coal seams were encountered in the drilling. The rock types present were typical of strata overlying coal measures and included claystone, fossil shales and fine-grained sandstones.

American Cyanamid Company's AM-9 is a dry-powder mixture of two acrylic monomers that is applied as an aqueous solution. When catalyzed a crosslinked polymer is formed that renders soil and rock formations impermeable to water.

Because solutions of AM-9 retain the same density and viscosity as water until the point of its instantaneous gelation, they could be pumped into the areas located by the dye in the same time intervals. The gel-time of the grout was set so that the leaky channels would be completely sealed. The use of 220 gallons of 10 percent AM-9 pumped into 15 bore holes was sufficient to eliminate the entry of water into the roof and ribs of the mine.

nized that court action may necessarily modify this program and that economically depressed communities in the Basin may have to depend on outside financial assistance.

- The establishment of a technical committee consisting of representatives of West Virginia, Pennsylvania, Maryland, the Ohio River Valley Water Sanitation Commission and the Federal Government to explore the means of abating pollution caused by coal-mine drainage is recommended. This committee will be charged with determining the amount of pollution from such mines. The committee also will be charged with developing a remedial program, including a cost estimate.

This technical committee on mine drainage control in the Monongahela Basin was activated in January, 1964. For details on its work see page 12.

MINE ACID CONTROL

In his statement at the Monongahela conference the chairman of ORSANCO, Mr. Joseph R. Shaw, expressed the hope that the discussion would focus on accelerating action for the control of mine-acid drainage. He said that the Commission had consistently sought to dispel the psychology of defeatism with respect to this problem that had shrouded both the coal industry and research organizations. And then he recounted these endeavors:

“First, it should be noted that in 1950 the Commission devoted a substantial part of its 2nd Annual Report (pp 29-34) to the Governors of the signatory states to an appraisal of the mine-acid problem, to an analysis of the legal position with regard to control, and to the possibilities of promoting corrective action.

“How baffling the problem was regarded then is revealed by the fact that some of the states actually exempted mine drainage from regulatory control because, in their view, means were not available to deal with it. Meantime, the Commonwealth of Pennsylvania was addressing itself in vigorous fashion to the matter. Not only did it support scientific research, but more importantly the Pennsylvania Sanitary Water Board promoted the application of practices at mining operations that minimized the effects of mine drainage.

“In developing its action program the Commission decided, among other things, that it would invite leaders of the coal industry to participate in seeking solutions. This brought about the establishment in 1951 of the ORSANCO Coal Industry Advisory Committee. In addition, the Commission sought to enlist the collaboration of two federal agencies — the Public Health Service and later the Bureau of Mines. On July 12, 1956, a resolution was adopted by the Commission petitioning the Surgeon General of the Public Health Service to consider inauguration of investigations looking toward the prevention, reduction and control of acid mine drainage. It was hoped that this petition might influence the Public Health Service to give cognizance to the problem in its expanding research programs. Meantime, possibilities of participation by the Bureau of Mines were explored.

“Nothing fruitful emerged from either of these efforts. In retrospect, it appears that while the Public Health Service had money for research, matters other than the mine-acid problem were given a higher priority; and although the Bureau of Mines displayed interest, it had virtually no funds for this purpose.

“Unwilling to be deterred by this unsatisfactory state of affairs, the Engineering Committee of ORSANCO began gathering evidence that suggested possibilities of doing something to curb the indiscriminate discharge of mine drainage. Much of this evidence came from observations in Pennsylvania and Indiana, where the state regulatory agencies and the coal operators had tackled the problem on an empirical basis and had achieved some success. In brief, the ORSANCO committee concluded that pollution from active mines could be ameliorated by: (1) Reducing entry of water into mines through diversion of surface streams and by sealing crevices; (2) Minimizing contact time of water with acid-forming materials in a mine; (3) Exercising greater care in disposal of gob and other refuse materials; (4) Proportioning drainage discharges from the mines with flow of water in the stream, as opposed to the common practice of pumping intermittent “slugs” of acid water; and (5) Employment of adequate closure procedures immediately following termination of mining activities.

“In developing these concepts, the Engineering Committee had the benefit of review and finally the unanimous endorsement of their application by the ORSANCO Coal Industry Advisory Committee. On the

recommendation of both committees, the Commission incorporated these practices in a control measure that was adopted by the eight states in 1960. To expedite application of these measures three developments may be noted:

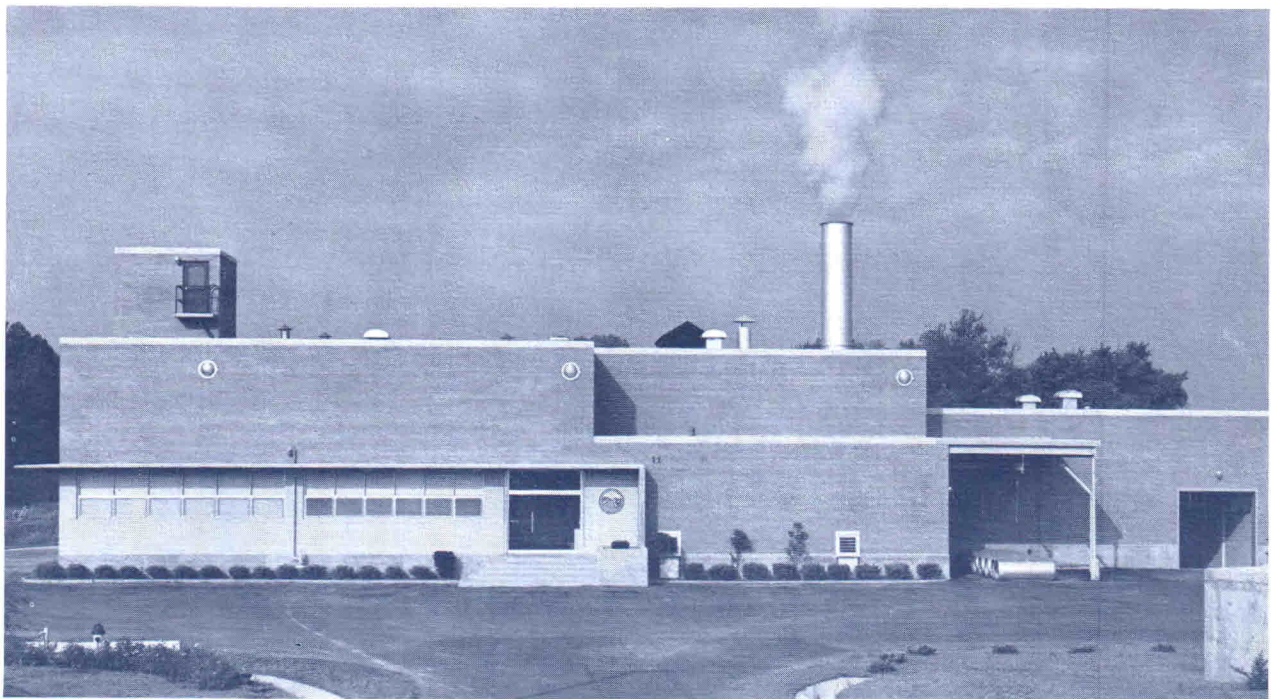
- The Commission denied recognition of acid mine drainage as qualifying for blanket exemption from pollution control laws. Thus, for the first time agreement was reached by the ORSANCO states and representatives of the coal industry that practical means were available to ameliorate the problem. In the history of regulatory practice this is indeed a significant development.
- The Commission then authorized its staff to conduct "curbstone clinics" for state agency personnel to develop familiarity with the application of corrective measures under field conditions.
- And finally, the ORSANCO Coal Industry Advisory Committee volunteered to promote field demonstration projects to aid mine operators in complying with the ORSANCO directives. In addition, the coal committee is developing a hand-

book for publication by the Commission that describes how situations at various types of mines may be dealt with. (This handbook was published in March 1964. It is titled: *Principles and Guide to Practices in the Control of Acid Mine-Drainage, supplemented with case histories*. Already thousands of copies have been distributed to mine operators.)

"Meantime, a documentary film titled *Coal and Water* has been produced by ORSANCO. This portrays the problems associated with acid mine-drainage and the steps that can be taken to ameliorate them."

Mr. Shaw concluded his summary with this comment: "While all of this represents a good start in coming to grips with drainage from active mines, the Commission is under no illusions about the problem of dealing with so-called abandoned mines. Despite conflicting opinions that have been aired before the Engineering Committee of ORSANCO, there seems to be some basis for belief that a program of sealing abandoned workings, where possible, may offer at least a partial remedy. Records disclose that during the mid-Thirties, when federal funds were available

On September 10, 1964, the commissioners of ORSANCO joined with the citizens of Huntington, W. Va. in the dedication of sewage-treatment facilities at the last major source of municipal pollution on the Ohio River. Pictured here is the service and sludge-processing building of the treatment works which cost \$2½ million. Interceptor sewers and pumping stations cost an additional \$6 million.



to provide employment and men were engaged on a mine-sealing program, there was a substantial reduction in acid conditions in some streams. These seals were not maintained when the work-relief program was discontinued.”

Recommendations of the conferees at the Monongahela conference in establishing a joint committee of state and federal representatives to furnish a contemporary appraisal of mine-drainage control was regarded as providing additional momentum to the endeavors promoted by the ORSANCO states.

PUBLIC AFFAIRS ACTIVITIES

In June of 1964 the Commission completed its fourth year on the production and distribution of “spot” announcements used as public-service features by 349 radio and 51 television stations in the Ohio Valley. Every thirteen weeks during this period a new set of messages was provided to these 400 stations, each designed to promote citizen understanding and support

for the eight-state crusade for clean streams. The most recent set was focussed toward prevention of stream littering.

At the end of this year the Commission decided to terminate, at least temporarily, this component of its public-affairs program. It was noted that the U. S. Department of Health, Education and Welfare recently inaugurated a similar program on a nationwide basis. Since this overlapped in part what ORSANCO was doing on a regional basis, it was felt that the Commission could use its limited funds to better advantage in other endeavors. The staff is continuing, however, to assist radio and television stations in development of local programs relating to advancement of pollution control.

In the development of documentary films, seven of which have been completed, attention has now turned to production of an educational film for employees of industrial plants. Tentatively titled *Good Housekeeping*, the purpose of the film is to reveal how carelessness in a plant may contribute to stream pollution and what can be done by individual employees to guard against such occurrences. Since the film is

Four communities in Ohio — Martin's Ferry, Bellaire, Bridgeport and Brookside — joined together for the financing and operation of this central sewage-treatment plant on the upper Ohio River. Completed early in 1964 by the Belmont County Sewer Authority No. 1, the treatment works cost \$1.2 million, and the investment in interceptor sewers was \$6 million.

