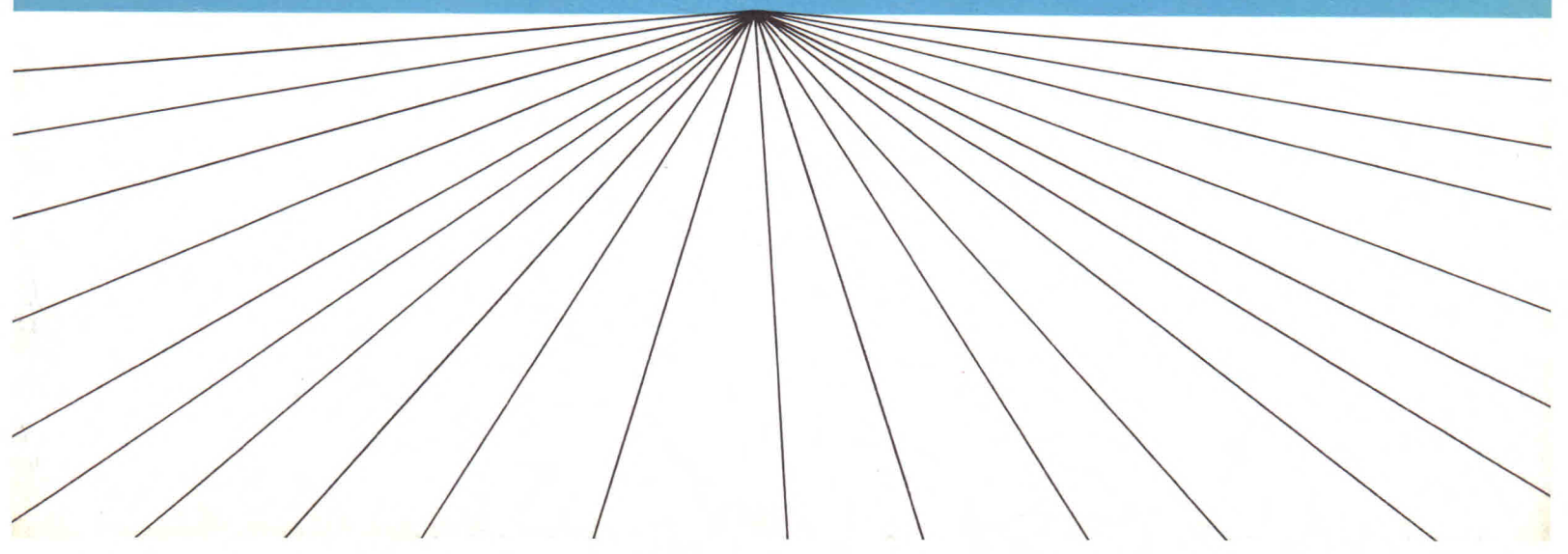


OHIO
RIVER
VALLEY
WATER
SANITATION
COMMISSION
FIFTEENTH
ANNUAL
REPORT

ON THE INTERSTATE CRUSADE
FOR CLEAN STREAMS
TO THE GOVERNORS OF
ILLINOIS, INDIANA, KENTUCKY,
NEW YORK, OHIO, PENNSYLVANIA,
VIRGINIA, WEST VIRGINIA

1963

"The journey of a thousand miles begins with one step"



"THE JOURNEY OF A THOUSAND



MILES BEGINS WITH ONE STEP" *

When eight states in the Ohio River Valley joined together in 1948 in a regional crusade for clean streams they embarked on a long journey. Now it can be said that the first major step toward the goal — elimination of gross pollution — is virtually completed. The size of the stride forward may be measured in terms of the thousands of waste-control facilities that have been constructed by municipalities and industries in the valley.

This “billion-dollar river clean-up” effort has been recognized by the American Society of Civil Engineers as worthy of its 1963 outstanding achievement award. And the Izaak Walton League at its national convention this year memorialized progress made in the Ohio Valley in curbing water pollution.

None of this should suggest, however, that the journey in quest of clean streams is nearing completion. Many more steps must be taken. There are local conditions of gross pollution still to be dealt with. Industrial-waste control is subject to further refinements. Abatement of acid mine-drainage claims aggressive attention. And inspection services must be expanded to assure proper performance of control facilities in operation.

Satisfaction with the advances made should provide renewed inspiration for continuing the journey ahead.

December 1, 1963

* Lao-Tse, *The Simple Way*

OHIO RIVER VALLEY WATER
SANITATION COMMISSION
Headquarters: 414 Walnut Street, Cincinnati, Ohio 45202



FIRST STEPS . . .

THE eight states signatory to the Ohio River Valley Water Sanitation Compact established as their first milestone in the crusade for clean streams the elimination of gross pollution. Progress during the past fifteen years in reaching this goal may be measured in many ways, not the least of which is the financial investment for construction of waste-control facilities. Progress also may be measured in terms of the population served by treatment works, by the number of industries complying with control regulations and in terms of river miles now relieved of gross pollution. By any of these standards, attainment of the first goal is in sight.

To appreciate the distance that has been travelled and to give perspective to the job ahead, a glance backward is helpful. The journey in quest of clean streams has its origins in the 1930's. Severe droughts at that time focussed attention on the fact that streams were being overburdened by wastes from an expanding industrial society.

The crusade for clean streams in the Ohio Valley may be regarded as a social reform movement. It was an endeavor to motivate millions of people and thousands of industries to participate in a joint effort to halt degradation of waterways. For this purpose, eight states negotiated a compact creating a regional coordinating agency known as the Ohio River Valley Water Sanitation Commission (ORSANCO). This compact offered an opportunity for testing whether a group of sovereign states could effectively pool their resources in dealing with a regional problem.

Conditions prevailing on the Ohio River, which traversed six of the states, supported the view that people were apathetic to their responsibilities for keeping streams clean. When the Commission was organized in 1948, more than 99 percent of the people along the thousand miles of this river discharged raw sewage. Equally depressing was the irresponsibility of industrial establishments in discharging untreated wastes.

This lack of interest in water-quality protection emphasized the need for leadership in bringing about a change in public attitudes. Accordingly, the states directed their Commission to channel a major part of its activities in educational efforts. Meantime, the Commission conducted investigations and public hearings for the establishment of sewage-treatment requirements. And each of the states then proceeded to secure compliance with the requirements for their communities. The record testifies eloquently to the

manner in which the states carried out this assignment.

To promote control of industrial wastes, the Commission invited industry leaders to participate in development of this phase of the program. This was accomplished through the creation of "industry-action" committees. Made up of representatives of generic groups such as steel, metal-finishing, chemical, coal, oil refining and paper, these committees have facilitated the coordination of effort in dealing with the complex problems of waste control.

Coincident with the advancement of active programs on control of municipal and industrial wastes, efforts also were made in other aspects of water-quality management.

A Water Users Committee, made up of managers of municipal and industrial water treatment plants was established to furnish the Commission with information on quality variations in the Ohio River. This was the beginning of the ORSANCO network of monitor stations. Analytical data from these stations has been employed in formulating waste-treatment requirements and in gaging progress of pollution-abatement activities.

An Aquatic-Life Advisory Committee has assisted the Commission in developing criteria for water quality related to the protection of fish and other aquatic life.

Steps taken toward the first milestone in pollution control have resulted in a billion-dollar investment in waste-treatment facilities. Today, 92 percent of the sewered population in the Ohio River compact district has treatment works in operation or under construction. Along the main stem of the Ohio River the record is 98.5 percent — a reversal of the situation in 1948 when less than one percent of the population was provided with such facilities.

Substantial progress also has been made in curbing industrial pollution. Today 86 percent of the industries discharging directly to streams in the Ohio Valley have installed facilities for waste control; the waste from several thousand more are being handled under cooperative arrangements with municipalities that have built treatment works.

Much more needs to be done to reach the ultimate goals envisioned by ORSANCO. However, accomplishments demonstrate that a pattern for effective coordination of effort has been established.



Chairman Bern Wright accepts the Outstanding Civil Engineering Achievement Award at the ORSANCO Commemoration and Award Luncheon held May 27, 1963 in Cincinnati. Seated at the speaker's table are, left to right: William H. Zimmer, president of the Cincinnati Gas and Electric Company, guest speaker at the luncheon; Mayor Walton H. Bachrach of Cincinnati; and Edmund Friedman, president of the American Society of Civil Engineers, who made the presentation.

The accomplishments of the eight states have merited one of the highest honors bestowed by the engineering profession. The American Society of Civil Engineers selected the basin-wide program as the Outstanding Civil Engineering Achievement of 1963. The outstanding-achievement award is made annually to an undertaking that contributes to the well-being of mankind and whose execution has been

marked by pioneering concepts. It recognizes the Ohio Valley regional crusade as the "most effective large-scale water pollution abatement program ever undertaken in the Western Hemisphere."

At this juncture, those who have dedicated their efforts in the journey to abate stream pollution can look back with pride at the long strides taken in a short span of time.

Regulatory agencies of the signatory states received replicas of the ASCE Award. Here, Acting Director Horton presents a replica to Governor William W. Scranton of Pennsylvania at ceremonies in Harrisburg, Pennsylvania. From left to right are Commissioner Karl M. Mason, Acting Director Horton, Commissioner Charles L. Wilbar, Jr., M.D., Governor Scranton and Commissioner M. K. McKay.





THE OUTSTANDING CIVIL ENGINEERING ACHIEVEMENT
1963
AWARDED IN A NATIONAL COMPETITION
OHIO RIVER BASIN CLEAN STREAMS PROGRAM
BY THE AMERICAN SOCIETY OF CIVIL ENGINEERS

The Outstanding Civil Engineering Achievement of the year is selected by the American Society of Civil Engineers and is awarded to a project that demonstrates exceptional engineering skills and constitutes a real and lasting service to mankind.

★

"..... The most effective large-scale water pollution abatement program ever undertaken in the Western Hemisphere."

— William H. Wisely
Executive Secretary
American Society of Civil Engineers
May 27, 1963

★

"The achievements in the Ohio River Valley reflect the great good that can be done by the States themselves when they vigorously and with firm purpose decide to solve a problem."

— Honorable Frank J. Lausche
Before United States Senate
March 14, 1963

★

"The progress in the Ohio Valley is an example to the entire nation of the effectiveness of regional coordination of pollution control"

— Isaac Walton League of America
National Convention, 1963



SECOND STEPS

[Redacted text]

[Redacted text]

NEXT steps forward are directed toward the following goals: Hastening completion of facilities by municipalities and industries that have not yet met their obligations; increased inspection and surveillance to insure proper performance of treatment works already built; refinement of waste-control practices; and continued assault on the acid mine-drainage problem.

CONSTRUCTION TIMETABLES

The job ahead to complete the municipal-construction phase of the eight-state program is not large when measured in terms of population still to be served. And the investment remaining to be made in treatment plants is small when compared with that already made.

Virtually all large and medium-size cities in the valley have installed treatment works. Of the communities still lacking facilities, only six have a population greater than 10,000; most of the remainder are villages with less than 2,000 population.

Some industries have not yet installed facilities necessary for compliance with minimum interstate requirements. Moreover, many industries will need improved facilities to meet control measures beyond minimum requirements.

The signatory states are now engaged in establishing "deadlines" for completion of construction by delinquent communities and industries. Satisfactory arrangements will depend in large measure on the availability of federal grants-in-aid. Since 1956 when such grants became available, few communities have been willing to proceed without assurance of federal funds.

INSPECTION AND SURVEILLANCE

Inspection and surveillance activities have been carried out in collaboration with state agencies for several years. Initially, these were made by boat and overland travel. More recently, surveillance activities have been augmented by the use of chartered airplane flights.

Air surveillance is an economical and effective means for spotting pollution-control violations. These conditions are photographed in color. Following each flight, written reports on violations are submitted to appropriate state agencies for follow-up action.

For the future, the Commission is considering establishment of a river-warden system for the Ohio River. Such a program, coordinated with air observations, would enhance present activities designed to insure prompt challenging of violators.

Water-quality monitoring — Surveillance activities include operation of a water-quality monitoring network, which involves the use of both manual and automatic sampling stations. Quality data is compiled by several operational procedures, the oldest of which is conducted by the Water Users Committee. Through the members of this committee, data on quality conditions from seventeen sampling locations is secured.

Efforts of the Water Users Committee are supplemented by means of a cooperative arrangement with the U. S. Geological Survey. Under this arrangement, approximately eleven hundred analyses are made each month on samples collected at eleven stations, five of which are on the Ohio River and six on the tributaries. Costs for these operations are borne equally by the Commission and the Geological Survey.

A third method used for water-quality monitoring is the ORSANCO ROBOT MONITOR system. At present, the system includes eleven field stations, strategically located in the valley, and a receiving-and-recording station at Commission headquarters. Data on water quality is transmitted automatically each hour to headquarters from six field stations (at the other stations data is recorded on-site). Quality parameters transmitted include dissolved oxygen, chloride, pH, specific conductance, oxidation-reduction potential, temperature and solar radiation.

For the future, the Commission contemplates installation of supplementary field stations and development of equipment for analyzing additional water-quality conditions. A prototype analyzer for measuring radioactivity is currently under development.

A special radioactivity-monitoring operation is conducted on a contractual basis with the University of Louisville. This project is directed toward development of information on the accumulation of radioactivity in fish, aquatic organisms and river sediments.

These activities of the Commission are in addition to and supplement the monitoring programs of the individual states, data from which is supplied to Commission headquarters.

Information on river flows, which is essential in evaluating river-quality conditions, is supplied by the U. S. Geological Survey. These records provide a basis for formulating waste-control regulations.

In 1958 the River Forecast Center of the U. S. Weather Bureau in Cincinnati inaugurated operations by which it supplies three-day forecasts on a daily basis on the amount and velocity of flow in the Ohio River and some of its tributaries. These forecasts are useful not only with regard to the operation of waste-control facilities, but also for the evaluation of potential hazards from spills and accidental discharges.

Data evaluation — Evaluation of water-quality and flow data has been an integral part of staff activities since establishment of the Commission. Results of this effort have appeared in many forms: Reference data manuals produced jointly by industry committees and the staff, recommendations on treatment requirements for the Ohio River and some of its tributaries, interpretations of conditions in “water quality” publications, reports on special surveys (such as the survey of the upper Ohio River basin during the 1959 steel strike), summaries and appraisals in annual reports.

To expedite processing of data, arrangements have been made to employ electronic computers. The volume of data coming into headquarters — particularly since the advent of the robot monitor system — makes the use of computers necessary.

Summaries of computer-processed data from transmitting robot monitor stations are included in a STAFF MEMO mailed periodically to commissioners and members of advisory committees. Preparation of these summaries involves analysis of some 21,000 items of data to show maximum, average and minimum values for each month.

Use of computers permits development of more sophisticated data-analysis systems. The staff is developing programs for correlation studies, assessment of long and short-term trends and predictions of the effect of upstream happenings on downstream quality.

REFINEMENT OF WASTE-CONTROL PRACTICES

Immediate and long-range goals of the Commission, as delineated in plans adopted May 28, 1963, give direction to the following refinements in waste-control practices: Establishment of “tailored” regu-

lations for industrial wastes; re-evaluation of sewage-treatment requirements for the Ohio River; and control of raw-sewage discharges and litter from boats and marinas.

Tailored industrial-waste requirements

— In 1955 the Commission established basic interstate control requirements for industrial waste discharges. At the same time it enunciated a policy and procedure to be followed in establishing additional — or “tailored” — industrial-waste requirements.

Now that 86 percent of the industrial plants discharging directly to streams in the compact district are complying with basic requirements, the Commission has directed that attention be given to the formulation of tailored requirements. In this connection the ORSANCO industry committees have been encouraged to undertake studies on industrial water-quality requirements and the costs of pollution control, and to assist the engineering committee of the Commission in developing uniform procedures for reporting waste-load data.

Re-evaluation of sewage-treatment requirements

— Changes in patterns of water use require continuing attention to waste-control regulations. On the Ohio River, in particular, the increase in recreational activities suggests that consideration be given to a re-evaluation of sewage-treatment requirements established several years ago. Inquiry also is needed to assess changes brought about in the regimen of the Ohio River as a result of the installation of new, fixed navigation dams.

Studies are under consideration that will include an appraisal of bacteriological criteria on which sewage-treatment requirements are based and an examination of epidemiological data.

Boats and marinas — Additional refinements in waste-control practices include attention to the discharge of raw sewage and litter from boats and marinas. Under consideration is a proposal that would require boats, marinas, and terminals to install facilities for macerating and disinfecting sewage before discharge to the river. Steps have been taken for an anti-litter campaign during the recreational season.

Federal planning activities — The Commission, by exchange of data and experiences, has offered its cooperation in development of a comprehensive plan for the Ohio Basin by the U. S. Public Health

Service as required by the Federal Water Pollution Control Act.

In view of the long-range character (six to eight years) of the investigations to be undertaken by the Public Health Service for development of such a plan, the Commission recognizes that some delinquent communities and industries might attempt to delay installation of facilities. Accordingly, the Commission on May 28, 1963, issued the following declaration of policy: "(a) Development of the federal comprehensive plan shall not be regarded as providing any reason for municipalities and industries to delay the construction of pollution-control works in accordance with the terms and conditions set forth in the Ohio River Valley Water Sanitation Compact, the provisions of which are being advanced by the signatory states; and (b) the Commission shall continue to require compliance with interstate pollution-control regulations 'within a time reasonable for construction of the necessary works.'"

ACID MINE-DRAINAGE

Although control of acid mine-drainage remains one of the most difficult problems in the valley, some important steps have been taken. For years the mine-drainage problem was shrouded in an atmosphere of defeatism, because of a widely-held belief that it would be futile to undertake control operations until complete answers regarding the complex reactions involved in the formation of mine acid had been developed through research.

The attitude was so entrenched that as late as 1955, when ORSANCO adopted basic requirements for control of industrial wastes, mine drainage was specifically exempted "until such time as practical means are available for control." Several states signatory to the compact provided similar exemptions. The concept of seeking to ameliorate conditions by applying knowledge already at hand gradually gained acceptance, and in 1960 the states decided they were in a position to remove the exemption and initiate controls.

Control measures established in 1960 by ORSANCO Resolution No. 5-60 call for: Diversion of water from mine workings where practicable, removal of water from mines as rapidly as possible to reduce contact time with acid-producing materials, handling of refuse and overburden in such manner as will minimize acid drainage, release of acid drain-

age on a continuous basis rather than in "slugs" of discharge, employment of adequate mine-closing measures on completion of operations, and chemical treatment under appropriate circumstances.

The Coal Industry Advisory Committee has promoted compliance with the provisions of Resolution No. 5-60. To aid in this effort, a guidebook was prepared, titled "Principles and Guide to Practices in the Control of Acid Mine-Drainage, Supplemented by Case Histories."

Another step taken this year was production of a film titled, *Coal and Water*. Shot in the seven coal-producing states of the Ohio Valley district, the film deals with the problem of "black water" as well as acid mine-drainage. The black water problem, which is caused by coal-washing operations, is being brought under control in many parts of the valley. *Coal and Water* explains how mining practices, both surface and underground, may be modified to minimize acid drainage. The film shows methods of segregating water and air from sulphuritic materials to prevent the formation of acid. It also shows various methods of land reclamation that are practiced by coal operators.

To assure further progress, the Commission has encouraged the Coal Industry Advisory Committee to promote demonstration projects. Such a project was recently undertaken in cooperation with the U. S. Bureau of Mines in the Kittanning, Pa., area.

PUBLIC-AFFAIRS PROGRAM

Public-affairs activities provide a necessary accompaniment to steps taken in the journey toward clean streams. Hardly a day goes by that the message of "clean streams" is not being aggressively communicated in the Ohio Valley. Enlisted in this effort — and generously supporting it — are hundreds of newspapers, radio and television stations, together with scores of service clubs, civic and professional organizations and Chambers of Commerce.

One phase of the public-affairs program involves the production of documentary films. This year two new films were produced: *The First Fifteen Years* and *Coal and Water*. Seven films have been produced to date; a listing of these is presented on page 19.

Copies of the films may be obtained from state regulatory agencies and Commission headquarters.

They are available for group showings and television programs.

Additional public-education tools include the use of "spot" announcements over radio and television. Recorded announcements, which are directed toward telling what is being done by the Ohio Valley states to curb pollution and how the individual may aid in this work, are distributed regularly to some 400 radio and television stations in the valley. The commercial value of air time donated by the broadcasting stations as a public service runs into millions of dollars.

Liaison with broadcasting stations has inspired television programs in which commissioners, officials

of state agencies and staff representatives discuss the work of the states and ORSANCO.

In recognition of the important role played by broadcasting stations, the Commission this year instituted a "Public Affairs Award." These are presented to stations "for outstanding public service in the crusade for clean streams."

In summary, "second steps" in the long journey — construction of treatment facilities, increased inspection and surveillance, refinement of waste-control practices, continued attack on the acid mine-drainage problem — are directed toward the orderly solution of remaining pollution problems in the valley.

REUSE OF OHIO RIVER WATER

Statements have been made to the effect that the Ohio River has been reused from four to seventeen times when the river reaches Cincinnati. However, findings based on a staff analysis of available water-use and flow data do not support such assertions. Less than 1.5 percent of the average flow of the Ohio River at Cincinnati has been used previously by an upstream municipality or for industrial processing.

During periods of drought, such as can be expected for one month in ten years, Ohio River water has been used *one-sixth of one time*. "Used" water is defined as water withdrawn for all purposes other than cooling and returned to the river. Ratios of used water to stream flow at three locations on the Ohio River are shown in the accompanying tabulation.

Under drought-flow conditions, there would have to be a 500-percent increase in municipal and industrial-process uses before the river could be considered to have been used one time.

It should be noted also that most of the water used for municipal purposes and industrial processing is treated prior to return to the river.

Water withdrawn for cooling purposes is not considered as "used" water, since it is returned to the river without impairment of its chemical or biological quality. Cumulative cooling-water requirements are as follows: At Huntington, 12,240 mgd (million gallons per day); at Cincinnati, 13,770 mgd, at Golconda, 25,875 mgd.

On tributaries of the Ohio, water withdrawn for municipal use and industrial processing ranges from two percent of drought flow (once in ten-year drought) on the Green River to 47 percent of drought flow on the Monongahela River.

These findings were published in the June 1963 issue of the *Journal of the American Water Works Association*. Reprints are available by addressing Commission headquarters.

	Cumulative use for municipal supply and industrial processing mgd *	Average stream flow		Drought stream flow **	
		Flow	Ratio of used water to flow	Flow	Ratio of used water to flow
		mgd		mgd	
Huntington, W. Va. (mi. 304)	690	49,100	1.4%	4,500	15.3%
Cincinnati, Ohio (mi. 463)	855	62,600	1.4%	5,400	15.8%
Golconda, Ill. (mi. 903)	1,470	168,000	0.9%	22,000	6.7%

* million gallons per day

** Average occurrence: one month in 10 years.

CONTRACT PROJECTS

Investigations and projects that require special skills, facilities and personnel are sponsored by the Commission through contractual arrangements. During the fiscal year ending June 30, 1963, the Commission authorized the following contracts:

PUBLIC AFFAIRS PROGRAM

Stuart Finley, Falls Church, Va.

Objective: To produce documentary films and a series of television and radio announcements relating to the conduct of the eight-state crusade for clean streams. Since April, 1960, seven films and twelve sets of spot announcements have been produced: *Status:* The current contract, which will terminate June 30, 1964, calls for preliminary script development for a "Good Housekeeping" film, as well as thirty-two radio and television public-service announcements to be made available to stations in the Ohio Valley. (\$25,000)

investigations initiated February 26, 1959. *Status:* Project extended to June 30, 1964. (\$8,000)

SERVICING OF ROBOT EQUIPMENT

Engineering Specialties, Madeira, Ohio

Objective: To maintain and improve operation of central station and field units of the electronic water-quality monitor system. Contract provides reimbursement for travel expenses and \$7.50 per hour for service. *Status:* Contract extended to June 30, 1964.

RADIOACTIVITY INVESTIGATIONS

University of Louisville, The Potamological Institute

Objective: To develop information on the accumulation of radio-materials by fish, aquatic organisms and in river sediments at selected stations along the Ohio River. In addition, to secure evaluation on radioactivity levels revealed from monitoring data. This is a continuation of

WATER QUALITY MONITORING

United States Geological Survey

Objective: To collect and analyze water samples from locations on the Ohio River and tributaries. Project was initiated in 1950 and has been continued by yearly contracts since that time. Funds provided by the Commission are matched dollar-for-dollar by the U.S.G.S. *Status:* Program extended to September 30, 1964. (\$10,000)

COMMITTEE ASSIGNMENTS

(for year ending June 30, 1964)

Executive Committee
Chairman JOSEPH R. SHAW
Vice-chairman BARTON HOLL
Past-chairman BERN WRIGHT

Illinois C. W. KLASSEN
 Indiana B. A. POOLE
 Kentucky J. O. MATLICK
 New York H. S. INGRAHAM, M.D.
 Ohio E. W. ARNOLD, M.D.
 Pennsylvania K. M. MASON
 Virginia R. H. WALKER
 West Virginia N. H. DYER, M.D.
 Federal L. L. TERRY, M.D.

Engineering Committee
 Ohio GEORGE H. EAGLE, *Chairman*
 Virginia A. H. PAESSLER, *Vice-chairman*
 Illinois CLARENCE W. KLASSEN
 Indiana B. A. POOLE
 Kentucky R. C. PICKARD
 New York M. H. THOMPSON
 Pennsylvania KARL M. MASON
 West Virginia BERN WRIGHT
 Corps of Engineers WILL BREWER
 Dept. of Interior RAYMOND E. JOHNSON
 U.S.P.H.S. GORDON MCCALLUM
 Secretary F. H. WARING
 Staff ROBERT K. HORTON

Audit
 BERN WRIGHT, *Chairman*
 W. H. SINGLETON
 L. H. HORNBECK

Bylaws
 HUDSON BIERY, *Chairman*
 MARION K. MCKAY
 MAURICE E. GOSNELL

Finance
 BARTON HOLL, *Chairman*
 B. A. POOLE
 J. O. MATLICK

Pension Trust
 BARTON HOLL
 CLARENCE W. KLASSEN
 ROBERT K. HORTON

Salaries and Personnel
 ROSS H. WALKER, *Chairman*
 N. H. DYER, M.D.
 CLARENCE W. KLASSEN

CHAIRMEN OF INDUSTRY AND ADVISORY COMMITTEES

(as of December 1, 1963)

Aquatic-Life Advisory Committee — LLOYD L. SMITH, JR., University of Minnesota, St. Paul, Minnesota
Chemical Industry Committee — WYATT E. WILLIAMS, Standard Ultramarine and Color Co., Huntington, West Virginia
Coal Industry Advisory Committee — LARRY COOK, Ohio Reclamation Association, Columbus, Ohio
Metal-Finishing Industry Action Committee — C. L. PRICHARD, Arvin Industries, Inc., Columbus, Indiana
Oil Refining Industry Action Committee — G. F. EISELE, The Pure Oil Co., Newark, Ohio
Pulp and Paper Industry Committee — W. C. MATHEWS, The Mead Corp., Chillicothe, Ohio
Steel Industry Action Committee — LOUIS F. BIRKEL, Republic Steel Corp., Cleveland, Ohio
Water Users Committee — F. R. PERRIN, South Pittsburgh Water Co., Pittsburgh, Pennsylvania

WATER QUALITY AND FLOW VARIATIONS

Water-quality monitoring and data evaluation represent a major responsibility of the Commission. Chemical and bacteriological data provide an understanding of river conditions, a basis for formulating pollution-control regulations and a means of checking the effectiveness of waste-treatment facilities.

Quality data and flow information for calendar year 1962 are summarized in the accompanying tabulations. Data for four sections of the Ohio River, including information from manually-operated and automated sampling stations, is presented in one table. The other table shows data from automated stations on tributaries.

Following is a general summary of data for the Ohio River main stem:

RIVER FLOW—There were three distinct patterns of flow in 1962. In the upper third of the river (down to the mouth of the Kanawha River), flows were deficient — about 13 percent less this year than normally

experienced in terms of yearly-average flow. In the central portion (mouth of Kanawha River to Louisville) flows were normal. At Cincinnati, for example, the yearly average flow was 95,000 cubic feet per second (cfs), which compares with the average flow for the past twenty years of 94,200 cfs. In the lower third of the river (Louisville to Cairo), flows averaged about 16 percent greater than normally expected.

The differences in flow patterns are reflected in quality conditions observed in the river. In general, concentrations of chemical constituents were higher than normal in the upper section because of the reduced amount of dilution water available. By the same token, concentrations were generally less than normal in the lower section because of a greater amount of dilution water.

ALKALINITY AND pH—Values were higher in 1962 than in 1961. The minimum monthly-average concentration of alkalinity in the upper portion of the river

WATER QUALITY AND FLOW VARIATIONS—OHIO RIVER 1962 *

Constituent	Mile 40 to 161 (Sewickley Gage)		Mile 190 to 351 (Huntington Gage)		Mile 463 to 560 (Cincinnati Gage)		Mile 601 to 963 (Louisville Gage)	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
Flow (cfs)	72,090	4,240	200,300	14,700	302,300	12,720	365,500	15,510
Alkyl Benzene Sulfonate (ABS)	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0
Alkalinity (as CaCO ₃)	53	10	44	16	61	27	87	41
Calcium	57	22	72	25	47	26	41	29
Chloride	80	8	180	11	86	11	79	10
Coliform (MPN/100 ml)	4,200	230	10,700	950	9,600	560	19,000	410
Color (units)	4	1	5	2	10	3	20	2
Dissolved Oxygen	14.0	3.1	10.5	2.8	12.0	4.3	9.3	2.6
Fluoride	0.7	0.1	0.7	0.1	0.6	0.1	0.4	0.1
Hardness, Total (as CaCO ₃)	287	81	326	84	220	88	196	92
Hardness, Non-Carb (as CaCO ₃)	276	69	296	57	176	54	144	25
Iron	3.5	0.14					2.3	0.36
Magnesium	12	6.1	16	6.1	12	7.0	9.9	5.5
Manganese	2.7	0.14			3.2	0		
Nitrate	8.6	3.2	7.0	2.4	10.0	3.4	5.6	2.8
Odor (threshold odor number)	4	2	31	4	39	12	7	3
Oxidation Reduction Potential (mv)	512	152	490	130	460	180		
pH (daily; units)	8.4	4.1	9.2	5.4	8.5	6.0	8.6	6.2
Phosphate	0.26	0.08	0.54	0.01	0.42	0.19	0.78	0.12
Potassium	4.8	1.7	5.1	1.7	3.3	1.4	2.2	1.4
Radioactivity (daily; $\mu\mu\text{c/l}$)	12.7	11.3	34.7	12.8	90.5	49.6	76.6	20.7
Silica	6.0	4.3	6.8	1.7	7.1	2.1	7.0	5.0
Sodium	43.0	8.6	70.0	10.0	38.0	8.2	14.0	7.6
Solids (total dissolved)	422	144	545	153	441	156	299	154
Specific Conductance (micromhos)	620	179	848	170	742	170	760	178
Sulfate	307	33	344	27	184	55	159	34
Temperature (deg. F)	83	35	81	34	83	36	84	35
Turbidity (units)	232	12	213	10	829	3	279	6

was 10 milligrams per liter (mg/l) in 1962, compared with 5 mg/l in 1961. Ranges in pH values in the upper portion were: 4.8 to 8.4 in 1962, and 4.2 to 7.7 in 1961.

The pattern of alkalinity concentrations in 1962, as in previous years, was one of relatively low values in the extreme upper section of the river, with steadily increasing values downstream from Weirton, W. Va. (mile 62). This trend is shown by the following yearly-average values: 15 mg/l at Weirton and 63 mg/l at Evansville, Ind. (mile 792). The trend in pH values was the same as that for alkalinity: Range at Weirton was 6.3 to 7.5, with a median value of 7.0; range at Evansville was 6.6 to 8.6, with a median of 7.4.

ALKYL BENZENE SULFONATE —

Monthly-average concentrations of ABS, the principal surface-active agent of household synthetic detergents, were 0.1 mg/l or less. The limiting value for ABS in potable water supplies recommended by U. S. Public Health Service Drinking Water Standards is 0.5 mg/l.

COLIFORMS—Coliform counts showed a continuing downward trend that began several years ago. Monthly-average concentrations in 1962 ranged from 230 to 19,000 MPN per 100 ml. The Commission's objective for raw water supplies is a count of 5,000 MPN; during the year concentrations were less than this 67 percent of the time.

DISSOLVED SOLIDS — Yearly-average concentrations in 1962 ranged from 191 to 306 mg/l. Values were slightly higher than those in 1961, when the range was from 195 to 259 mg/l. The differences are attributable for the most part to variations in flow conditions for the two years.

Drinking Water Standards recommend that dissolved solids in potable water supplies not exceed 500 mg/l. In terms of monthly-average values, concentrations were less than 500 mg/l for 98 percent of the time.

FLUORIDE— The range in monthly-average concentrations in 1962 was 0.1 to 0.7 mg/l, which is ap-

proximately the same range as that observed in 1961. Drinking Water Standards recommend fluoride levels of 0.7 to 1.2 mg/l in artificially-fluorated water supplies.

HARDNESS — Concentrations in the upper part of the river were higher in 1962 than in 1961. Ranges, in terms of monthly averages, were: 81 to 287 mg/l in 1962, and 75 to 242 mg/l in 1961. The same general pattern was observed as far downstream as Cincinnati, but differences in concentrations for the two years were not as great. Downstream from Cincinnati hardness levels were about the same for the two years: 92 to 196 mg/l in 1962; 93 to 197 mg/l in 1961.

RADIOACTIVITY—Levels of radioactivity in the Ohio River in 1962, although higher than those in 1961, were far below the maximum permissible limit of 1,000 micro-microcuries per liter ($\mu\mu\text{C}/\text{l}$) of gross beta activity set forth in the Drinking Water Standards.

Levels of gross beta activity for all water samples taken in 1962 ranged from 2 to 172 $\mu\mu\text{C}/\text{l}$, with an average of 33. Average activity for all water samples in 1961 was 13 $\mu\mu\text{C}/\text{l}$.

Analyses of gross beta activity on plankton, fish and silt samples in 1962 showed the following results: Plankton samples ranged from 0 to 2.4 $\mu\mu\text{C}/\text{l}$, average of 0.6; fish samples ranged from 0 to 380 $\mu\mu\text{C}$ per gram, average of 15; silt samples ranged from 1 to 71 $\mu\mu\text{C}$ per gram, average of 25.

SULFATE — Concentrations were highest in the section of the Ohio River upstream from the mouth of the Big Sandy River (mile 317). Monthly-average values in that section were 27 to 344 mg/l. Below the mouth of the Big Sandy the range in monthly averages was 34 to 184 mg/l.

Drinking Water Standards recommend that sulfate content of potable water supplies not exceed 250 mg/l. In terms of monthly-average values, concentrations were less than 250 mg/l about 95 percent of the time.

WATER QUALITY AND FLOW VARIATIONS—TRIBUTARIES 1962 *

Constituent	MONONGAHELA R. (Charleroi, Pa.)		ALLEGHENY R. (Oakmont, Pa.)		BEAVER R. (Beaver Falls, Pa.)		MUSKINGUM R. (Beverly, Ohio)		KANAWHA R. (Winfield, W. Va.)		NEW R. (Glen Lyn, Va.)		WABASH R. (Sullivan, Ind.)	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
low (cfs)	13,000	970	18,400	1,900	8,160	800	21,000	900	36,000	3,000	7,000	1,600	15,700	2,300
Conductivity (micromhos)	950	216	522	88	661	204	1,480	283	564	70	142	83	774	372
Dissolved Oxygen (mg/l)	12.5	4.3	16.5	6.1	10.0	3.1	11.0	4.7	10.0	0.6	8.4	4.8	8.9	2.2
pH (hourly; units)	6.14	2.89	8.38	3.54	9.55	4.49	10.96	5.63	11.32	1.08	8.72	6.42	10.77	6.79
Temperature (deg. F.)	79	37	79	36	80	38	93	37	84	43	76	40	82	37

* Ranges in terms of monthly averages except as noted. Flow information based on forecasts provided by U. S. Weather Bureau.

TALLY FOR THE VALLEY

The status of municipal and industrial waste-control facilities in the Ohio Valley district on July 1, 1963, is compiled from the reports supplied by the eight signatory states.

MUNICIPAL STATUS — Continuing progress in building facilities is indicated by new-construction starts at 42 communities, which have a combined population of 148,105. In addition, improvements to existing facilities were started at 17 communities serving 127,651. During the year new works were completed and placed in operation at 50 communities, the combined population of which is 245,357. Improvements to 31 existing

plants were completed and placed in operation serving 302,424.

Ninety-two percent of the 11.5 million sewered population in the district is served by treatment plants now in operation or under construction.

INDUSTRIAL STATUS — Of the 1,713 industrial plants discharging directly to streams, 86 percent (1,467 plants) have installed facilities that meet basic control requirements established by ORSANCO. Seventy-eight percent (1,331 plants) are operating control facilities rated as "acceptable" by the signatory states.

INDUSTRIAL WASTE-CONTROL FACILITIES — July 1, 1963

STATUS	ILL.	IND.	KY.	N.Y.	OHIO	PA.	VA.	W.VA.	TOTAL	Percent of TOTAL
Control currently acceptable	11	186	153	18	296	425	42	200	1,331	77.7
Control facilities inadequate, improvements in progress	0	0	2	0	8	3	1	7	21	1.2
Control provided, but not adequate	7	25	24	8	64	82	4	11	225	13.1
New control facilities under construction	0	13	0	0	1	10	0	15	39	2.3
Planning treatment facilities or preparing to connect to municipal sewers	0	6	2	7	12	44	2	12	85	5.0
No action by company	0	0	0	7	0	3	1	1	12	0.7
Total number of industries	18	230	181	40	381	567	50	246	1,713	100.0
Complying with ORSANCO minimum requirements	18	208	163	20	358	451	45	204	1,467	85.6

MUNICIPAL AND INSTITUTIONAL SEWAGE-TREATMENT FACILITIES — July 1, 1963

STATUS	Number of communities (top number) and population served (bottom number)								TOTAL	Percent of TOTAL
	ILL.	IND.	KY.	N.Y.	OHIO	PA.	VA.	W.VA.		
Control currently acceptable	60 320,816	150 1,198,944	163 1,145,905	6 31,868	278 3,199,875	251 2,496,662	32 117,698	60 428,157	1,000 8,939,925	57.2 78.0
Treatment provided, improvements under construction	0 0	8 545,771	4 7,198	0 0	2 5,767	0 0	0 0	0 0	14 558,736	0.8 4.9
Treatment provided, improvements needed	2 12,353	14 62,277	17 63,627	8 66,191	24 155,140	23 110,749	24 22,879	10 28,416	122 521,632	7.0 4.6
New treatment works under construction	3 2,901	5 6,299	17 42,096	0 0	12 206,427	8 59,814	0 0	14 158,653	59 476,190	3.4 4.2
No treatment, construction not started	4 16,398	111 126,469	38 70,580	13 17,875	107 118,914	136 375,612	35 48,795	108 186,136	552 960,779	31.6 8.3
TOTAL	69 352,468	288 1,939,760	239 1,329,406	27 115,934	423 3,686,123	418 3,042,837	91 189,372	192 801,362	1,747 11,457,262	100.0 100.0

COMPLIANCE PROCEEDINGS

Under the provisions of Article IX of the Compact, the Commission is empowered to issue orders and, if necessary, to seek compliance with those orders through the courts.

The Commission has not found it necessary to follow through on all the legal formalities set forth in Article IX. However, six cases have been referred to the Commission regarding which proceedings under Article IX appeared necessary or were actually started. The cases are as follows:

Gallipolis, Ohio— In April 1956, at the request of the Commissioners for Ohio, the Commission authorized its Legal Counsel to cooperate with the Attorney General of Ohio regarding court action by the State against the City. In November of that year, the Commission ordered an investigation by the staff, following which, Gallipolis was requested to submit a plan of action for compliance with control regulations. In January 1958, the City reported that necessary financial arrangements had been made in order to begin construction work. The new sewage-treatment plant was completed December 1959.

Huntington, W. Va.— Proceedings against Huntington began in June 1959 when, at the request of the West Virginia Commissioners, the Commission requested that a plan of action be submitted by the City. In January 1960, the Commission ordered a public hearing. However, in April 1960 the City submitted a plan of action that was acceptable and a hearing was not necessary. Construction has been started and treatment will begin during the summer of 1964, considerably ahead of the deadline set by the Commission for December, 1964.

Terre Haute, Ind. — In September 1960, at the request of the states involved — Illinois and Indiana — Terre Haute was requested to submit a plan of compliance action. However, formal hearings against the City were not needed since negotiations by the Indiana Stream Pollution Control Board and the Commission resulted in the submission of an acceptable finance-and-construction timetable. Construction of Terre Haute's sewage-treatment plant was begun in December 1961 and completed in June 1963.

Youngstown, Ohio — In July 1961, the Ohio Water Pollution Control Board adopted a resolution requesting the Ohio Commissioners to consider the advisability of ORSANCO action against Youngstown. However, in September 1961, Ohio officials reported that Youngstown was planning to inaugurate a construction program which is currently underway.

Pomeroy, Ohio and Middleport, Ohio — The cases of Pomeroy and Middleport were first brought to the attention of the Commission in May 1961 by the Ohio Commissioners. Visits were made to both villages by a Fact-Finding Committee and representatives of both villages appeared before the Commission.

By September 1962, evidence showed that Pomeroy was making efforts to move forward and, at the request of the Ohio Commissioners, the Pomeroy case was referred back to the state agency for development of a satisfactory finance-and-construction timetable.

The case against Middleport was continued and, in accordance with the provisions of Article IX of the Compact, a public hearing was held February 28, 1963. The Hearing Board is currently preparing a report for action by the Commission.

FEDERAL AID PROGRAM

Under provisions of the Federal Water Pollution Control Act, enacted in 1956 and amended in 1961, grants-in-aid are made to municipalities for construction of sewage-treatment facilities. In addition, grants-in-aid are available under the Public Works Acceleration Act (Public Law 87-658), which became effective September 14, 1962.

During 1962-63 federal grants under these two laws were awarded for construction of 129 projects serving 708,700 in the Ohio Valley district.

Following is a summary of federal-grant allocations in the compact district since 1956. The summary is based on data in the June 30, 1963, *Project Register* of the U. S. Public Health Service. In the tabulation, *WPC*

indicates grants made under the Water Pollution Control Act; *PWA* indicates grants under the Public Works Acceleration Act.

Year	No. of Projects	Pop. Served	Estimated Cost of Projects	Federal Grants
1956-57	30	1,588,400	\$ 13,846,400	\$ 3,616,200
1957-58	51	863,300	27,421,300	5,907,900
1958-59	47	577,700	29,298,300	6,564,300
1959-60	46	351,000	24,464,100	5,557,400
1960-61	46	268,700	21,733,300	4,787,500
1961-62	67	486,900	29,726,600	6,892,000
1962-63				
WPC	71	369,000	27,695,600	6,417,100
PWA	38	181,800	12,996,200	6,343,200
Both	20	157,900	12,260,800	5,868,600
Total	416	4,844,700	\$199,442,600	\$51,954,200

MUNICIPALITIES IN THE OHIO VALLEY RECEIVING GRANTS- IN-AID UNDER THE WATER POLLUTION CONTROL ACT AND THE PUBLIC WORKS ACCELERATION ACT

July 1, 1962 through June 30, 1963

(T indicates treatment facilities; S is sewers)

Municipality	Pop. 1960	Type	Est. Cost Dollars	Federal WPC	Grant PWA	Municipality	Pop. 1960	Type	Est. Cost Dollars	Federal WPC	Grant PWA
Brookport, Ill.	1,200	T	\$ 69,500	\$ 20,900		Danville, Ohio	900	T	105,000	31,700	
Cairo, Ill.	9,300	T-S	530,000		\$265,000	East Palestine, Ohio	5,200	T	269,700	80,900	
Carrier Mills, Ill.	2,000	T	140,000		70,000	Green County Board of Commissioners, Little Miami S.D., Ohio	11,500	T-S	785,900	235,800	
Enfield, Ill.	800	T	41,400	12,400		Kingston, Ohio	1,000	T	171,000	51,300	
Fairfield, Ill.	6,400	T	53,700		26,900	Mahoning County Board of Commissioners, West Austintown S.D., Ohio	6,000	T-S	376,000	112,800	
Robinson, Ill.	7,200	T	28,400	8,500		Mahoning County, Board- man S.D., Ohio	25,000	T	1,985,000	250,000	742,500
West Salem, Ill.	1,000	T	87,000		43,500	Mason, Ohio	4,700	T-S	524,600	157,400	
Anderson, Ind.	49,100	T	3,817,500	250,000		Monroe, Ohio	1,500	T-S	361,800	108,500	
Bargersville, Ind.	600	T-S	143,000	42,900		New Middletown, Mahoning County Board of Commissioners, Ohio	1,900	T-S	176,500	53,000	
Brookville, Ind.	2,600	T-S	299,500	89,800		New Paris, Ohio	1,700	T-S	110,000	33,000	
Campbellsburg, Ind.	600	T-S	64,200	31,100		Rayland, Ohio	700	T-S	25,200	7,600	
Cannelton, Ind.	1,800	T-S	253,400	76,000		Wilmington, Ohio	8,900	T	292,000	87,600	
Cloverdale, Ind.	700	T-S	73,200	21,900		Belle Vernon, Pa.	1,800	T-S	1,014,000	250,000	
Corydon, Ind.	2,700	T-S	263,400		131,700	Bradford, Foster Twp. Auth., Pa.	—	S	220,000	66,000	
Dale, Ind.	900	T-S	112,000		56,000	Bradford S.A., Pa.	15,100	S	153,000		76,500
Fowler, Ind.	2,500	T-S	178,300	53,500		Butler, Pa.	(23,000)	T-S	2,152,500		1,076,300
Lawrenceburg, Ind.	5,000	T-S	947,400	250,000		Crescent Heights, Pa.	1,400	T-S	285,300		142,700
Loogootee, Ind.	2,900	T-S	209,100		101,800	Dravosburg, Pa.	3,500	T-S	500,000	150,000	
Morgantown, Ind.	1,000	T	114,000		57,000	Duquesne, Pa.	15,000	T-S	950,000	250,000	
Orleans, Ind.	1,700	T	246,000	73,700		Foxburg, Pa.	400	T-S	115,800		57,900
Roanoke, Ind.	900	T	177,700	53,300		Greensburg, Pa.	17,400	T-S	3,088,100	250,000	
St. Paul, Ind.	700	T	120,200	36,100		Latrobe, Pa.	11,900	T-S	2,147,200		1,073,600
Troy, Ind.	500	T-S	73,000		36,500	Mt. Jewett, Pa.	1,200	T	137,100	32,100	
Adairville, Ky.	800	T-S	182,300		91,100	Oakdale, Pa.	1,700	T-S	262,700	78,800	
Beattyville, Ky.	1,000	T-S	137,000	41,000		Punxsutawney, Pa.	8,800	T	554,200	166,300	
Bloomfield, Ky.	900	T-S	132,300	39,700		Rockwood, Pa.	1,100	T-S	272,700		136,300
Bowling Green, Ky.	28,300	T-S	2,481,800	600,000		Rouseville, Pa.	900	T-S	112,500	33,800	
Brandenburg, Ky.	1,500	T-S	352,500	103,000		Sheffield, Pa.	2,000	T-S	449,500		224,800
Burkesville, Ky.	1,700	T-S	130,000	39,000		Upper St. Clair Twp., Pa.	8,300	S	520,400	155,100	
Cadiz, Ky.	2,000	T-S	340,600		170,300	Waterford, Pa.	1,400	T-S	215,400	64,600	
Catlettsburg, Ky.	3,900	T-S	801,900	78,300	465,100	West Mead Twp., Pa.	5,100	T-S	653,600	191,100	
Cave City, Ky.	1,400	T-S	316,000	94,800	63,200	Big Stone Gap, Va.	4,700	T-S	500,000	162,000	100,000
Cloverport, Ky.	1,300	T-S	177,600		88,800	Clintwood, Va.	1,400	T-S	229,000	68,700	45,800
Cumberland, Ky.	4,300	T-S	618,600		352,600	Coeburn, Va.	2,500	T	170,500		85,300
Danville, Ky.	9,000	T-S	105,000	31,500		Gate City, Va.	2,100	T-S	345,300	98,200	
Danville State Hosp., Ky.	2,100	T-S	130,600	39,200		Jonesville, Va.	700	T-S	94,400		47,200
Dawson Springs, Ky.	3,000	T-S	212,600	63,800		Norton, Va.	5,000	T-S	673,600	163,800	
Elkton, Ky.	1,400	T-S	302,600		151,300	Pennington Gap, Va.	1,800	T-S	190,200	57,100	
Eddyville State Prison, Ky.	1,500	T-S	146,800	44,000		Rich Creek, Va.	700	T-S	148,400	44,300	
Georgetown, Ky.	7,000	T-S	551,200	128,600	85,700	Wise, Va.	2,600	T	211,000	53,000	
Glasgow, Ky.	10,100	S	224,000		87,000	Beckley, W. Va.	18,600	T	107,300		53,700
Greenup, Ky.	1,200	T	124,000		62,000	Bethlehem, W. Va.	2,300	S	364,000		182,000
Harrodsburg, Ky.	6,100	T	114,700	34,400		Cameron, W. Va.	1,700	T	514,400	154,300	
Hazel, Ky.	300	T	25,200	7,500	5,000	Ceredo, W. Va.	1,400	T-S	113,000	26,300	17,500
Henderson, Ky.	16,900	S	331,500	149,500		Charleston, W. Va.	85,800	S	826,500	248,000	
Horse Cave, Ky.	1,800	T-S	305,000	83,300	55,600	Chesapeake, W. Va.	2,700	T-S	314,700		62,900
Irvine, Ky.	3,000	T-S	716,000		358,000	Fairview, W. Va.	700	T-S	189,200	56,800	
Jeffersonton, Ky.	3,400	S	45,000	13,500		Glenville, W. Va.	1,800	T-S	421,900		210,900
Kuttawa, Ky.	600	T-S	197,400	59,200	39,500	Huntington, W. Va.	83,600	T	1,576,600	430,000	
Lakeland State Hosp., Ky.	2,600	T-S	159,400	47,800				S	986,800		493,400
Lancaster, Ky.	3,000	T	248,000	32,400	91,600	Logan, W. Va.	4,200	T-S	309,000	92,700	
Lebanon Junction, Ky.	1,500	T-S	133,400	38,000		Midway P.S.D., Bluefield, W. Va.	19,300	T	33,100		16,600
Louisa, Ky.	2,100	T-S	378,400	108,000	75,400	Montgomery, W. Va.	3,000	T-S	446,900	116,800	106,600
Loyall, Ky.	1,300	T-S	218,400		109,200	New Haven, W. Va.	1,300	T-S	166,000		33,200
Mason County S.D., No. 1, Ky.	—	T-S	43,200	12,900		Parsons, W. Va.	1,800	T	213,000	63,900	
Morgantown, Ky.	1,300	T-S	143,400	43,000		Rowlesburg, W. Va.	1,000	T-S	276,100	55,500	82,500
Mt. Vernon, Ky.	1,200	T-S	176,900	53,100		St. Marys, W. Va.	2,400	T-S	205,800	61,700	
Munfordville, Ky.	1,200	T-S	137,700		58,700	Smithers, W. Va.	1,700	T-S	441,500	132,500	
North Middletown, Ky.	300	T	102,000	30,600		West Hamlin, W. Va.	800	T	132,800		66,400
Owenton, Ky.	1,400	T	101,100	30,300		Williamson, W. Va.	6,700	T-S	833,300	250,000	140,200
Pikeville, Ky.	4,800	T-S	1,740,000	424,900	509,900						
Radcliff, Ky.	3,400	T	385,000	115,500	77,000						
Russellville, Ky.	5,900	T-S	475,000	237,500							
Stanton, Ky.	800	T-S	185,000		92,500						
Taylorsville, Ky.	900	T	86,000	25,800	14,500						
Vanceburg, Ky.	1,900	T-S	280,000	75,600	64,400						
Williamsburg, Ky.	3,500	T-S	420,500	136,200							
Ashville, Ohio	1,600	T-S	153,000	45,900							
Batavia, Ohio	1,700	T	78,600	23,600							
Bealessville, Ohio	400	T-S	42,500	12,800							
TOTAL: 129						708,700			\$52,952,600	\$9,010,300	\$9,618,600

ADMINISTRATIVE AFFAIRS

Mr. Bern Wright of West Virginia served as chairman during the year covered by this report. Elected to take office on July 1, 1963, were: Mr. Joseph R. Shaw of New York as chairman, and Mr. Barton Holl of Ohio as vice-chairman.

Chairman-elect Shaw has been a commissioner of ORSANCO since 1954 when he was appointed by Governor Thomas E. Dewey. Mr. Shaw is president of Associated Industries of New York State, Inc. and serves on many government and lawmaking advisory councils. He graduated from St. John's University and received a law degree from Fordham University.

MEMBERSHIP CHANGES

Dr. Emmett W. Arnold, Director of Health, State of Ohio, was appointed to the Commission May 20, 1963, by Governor Rhodes to succeed Dr. Ralph E. Dwork (resigned); Dr. Hollis S. Ingraham, Health Commissioner, State of New York, was appointed February 20, 1963, by Governor Rockefeller, to succeed Dr. Herman E. Hilleboe (retired); and Dr. Raymond E. Johnson, Chief, U. S. Fish and Wildlife Service, was appointed April 11, 1963, by President Kennedy to succeed Dr. O. Lloyd Meehan (retired).



Chairman Joseph R. Shaw of New York.

STAFF

Director Cleary was granted a leave of absence by the Commission effective April 8, 1963, to accept a fellowship with Resources For The Future, Inc., Washington, D. C.; he is engaged in writing a case history of the ORSANCO program. In his absence, Commission affairs have been administered by Robert K. Horton, Acting Director.

APPROPRIATIONS

Appropriations from the states totalled \$130,000 for the fiscal year, the same as that received annually since 1955. A grant of \$108,238 was received from the Department of Health, Education, and Welfare, in accordance with provisions of the Federal Water Pollution Control Act. A financial statement for the fiscal year of this report appears on page 20.

COMMISSION PUBLICATIONS

***WABASH RIVER POLLUTION-ABATEMENT NEEDS**

Aug. 1950 — Recommendations, analysis and data for water conservation by pollution control between Terre Haute, Ind. and Mt. Carmel, Ill.

BACTERIAL-QUALITY OBJECTIVES FOR THE OHIO RIVER

June 1951 — A guide for evaluation of the sanitary condition of waters used for potable supplies and recreational purposes.

PHENOL WASTES TREATMENT BY CHEMICAL OXIDATION

June 1951 — Report on a cooperative research project showing how phenols can be destroyed by three methods of chemical oxidation (chlorine, ozone and chlorine dioxide). (Price \$1.00)

***POLLUTION PATTERNS IN THE OHIO RIVER — 1950**

June 1951 — Water-quality conditions and changes revealed by simultaneous sampling of a 963-mile stretch of the Ohio River.

PLATING-ROOM CONTROLS FOR POLLUTION ABATEMENT

July 1951 — A guidebook of principles and practices for curbing losses of solutions and metals that otherwise might find their way into water courses. Compiled by Metal-Finishing Industry Action Committee. (Price 50¢)

***BRINE CONTAMINATION IN THE MUSKINGUM RIVER**

Aug. 1951 — Determination of the nature and magnitude of brine-waste discharges from salt processing operations and their effect on water quality.

***OHIO RIVER POLLUTION-ABATEMENT NEEDS — HUNTINGTON TO CINCINNATI STRETCH**

Feb. 1952 — Findings on treatment requirements for maintaining oxygen and bacterial-quality objectives used as the basis for Treatment Standard No. 2.

PLANNING AND MAKING INDUSTRIAL WASTE SURVEYS

April 1952 — Detailed instructions for measuring volume of waste flow, obtaining representative samples and calculating waste loads. Compiled by Metal-Finishing Industry Action Committee. (Price \$1.00)

HOW TO GET SEWAGE TREATMENT WORKS IN OHIO

June 1952 — A guide describing step-by-step engineering and financial procedures for cities or villages undertaking a sewage-works project. (Price \$1.00)

***DISPOSAL OF SPENT SULFATE PICKLING SOLUTIONS**

Oct. 1952 — An analysis of methods for treating spent solutions resulting from sulfuric acid pickling to reduce stream pollution. Compiled by the Steel Industry Action Committee.

***METHODS FOR TREATING METAL-FINISHING WASTES**

Jan. 1953 — An evaluation of various disposal methods and their applicability to specific waste control conditions. Compiled by Metal-Finishing Industry Action Committee.

REDUCING PHENOL WASTES FROM COKE PLANTS

Jan. 1953 — Sources, volumes and concentrations of phenolic wastes and methods for reduction by process

changes or treatment. Compiled by Steel Industry Action Committee. (Price \$1.00)

***MULTIPLE-PURPOSE RESERVOIRS AND POLLUTION CONTROL BENEFITS**

Jan. 1953 — Description and status of the 80-unit reservoir program of the U. S. Corps of Engineers in the Ohio River Basin with reference to its present and anticipated effects on pollution abatement.

OHIO RIVER POLLUTION-ABATEMENT NEEDS — PITTSBURGH TO HUNTINGTON STRETCH

March 1953 — Findings on treatment requirements for maintaining oxygen and bacterial-quality objectives used as the basis for Treatment Standards No. 3 and No. 4.

OHIO RIVER POLLUTION-ABATEMENT NEEDS — CINCINNATI TO CAIRO STRETCH

Nov. 1953 — Findings on treatment requirements for maintaining oxygen and bacterial-quality objectives for use at public hearing.

PROCEDURES FOR ANALYZING METAL-FINISHING WASTES

Aug. 1954 — Methods designed to screen out interfering substances and selected for accuracy and reproducibility of results. Compiled by Metal-Finishing Industry Action Committee. (Price \$1.00)

PROCEDURES FOR INVESTIGATION OF FISH-KILLS

March 1956 — A practical outline of what to do and how to do it, designed for the agency or individual charged with responsibility for investigating a fish-kill. Contains bibliography on bioassays, toxicity and biological indicators of pollution. (Price 50¢)

WATER QUALITY AND FLOW VARIATIONS IN THE OHIO RIVER — 1951-55

March 1957 — A compilation of chemical and bacteriological analyses coupled with flow-discharge records from a network of monitor stations. Includes a hydrographic study of the flow-variability pattern, particularly with regard to minimum flows. (Price \$2.00) Analyses also available for 1956-57. (Price \$2.00)

DUST RECOVERY PRACTICE AT BLAST FURNACES

Jan. 1958 — An evaluation of settleable solids formation and recovery at mills in the Ohio Valley and a suggested procedure for defining performance of waste-water clarifiers. Compiled by Steel Industry Action Committee. (Price \$1.00)

REGULATORY ACTIONS

Jan. 1961 (revised Jan. 1963) — A compendium of regulatory actions by the Commission for the control of sewage, industrial wastes and other substances.

CONTROL OF ACID MINE DRAINAGE

Sept. 1963 — Principles and guide to practices in the control of acid mine-drainage, supplemented by case histories with illustrations. Compiled by the Coal Industry Advisory Committee as a handbook for coal operators and officials of pollution control agencies.

COMMITTEE REPORTS RELEASED FOR PUBLICATION

AQUATIC-LIFE ADVISORY COMMITTEE

"Aquatic-Life Water-Quality Criteria" — First, second and third progress reports, *Sewage and Industrial Wastes*, March, 1955, p. 321, May 1956, p. 678 and January 1960, p. 65, respectively. First report defines meaning of water quality suitable for fish life and sets forth recommendations for dissolved oxygen and hydrogen-ion concentration, and outlines bioassay criteria. Second report presents conclusions with regard to temperature, dissolved solids, settleable solids, color, chloride and fluoride ions. Third report contains discussions on effect of radioactivity, detergents, cyanides, phenolic compounds, iron and manganese on aquatic life.

CHEMICAL INDUSTRY ADVISORY COMMITTEE

"Detergents in Sewage and Surface Water" — *Industrial Wastes*, July-Aug. 1956, p. 212. A report on development of analytical procedures and research activities.

"Site Selection for Chemical Industry Plants" — *Industrial Wastes*, Jan.-Feb. 1957, p. 24. Originally titled "Operation and Design Practice as Related to Pollution Control in the Chemical Industry," this report deals specifically with treatment and disposal of water-borne wastes.

"Current Practices in Municipal Treatment of Industrial Wastes" — *Sewage and Industrial Wastes*, June 1957, p. 672. A survey of 100 sewage-treatment plants analyzed with respect to their handling of industrial wastes.

"Selecting Sites for Chemical Plants" — *Industrial Wastes*, March-April 1958, p. 46. Waste disposal considerations as they relate to the location of new processing facilities.

"Components of Household Synthetic Detergents in Water and Sewage" — *American Water Works Association*

Journal, March, 1963, p. 369. A report of the Detergent Subcommittee on sanitary engineering problems caused by synthetic detergents used for household dishwashing and laundering.

OIL REFINING INDUSTRY ACTION COMMITTEE

"Foul Condensate Treatment and Disposal" — *Sewage and Industrial Wastes*, Feb. 1958, p. 185. Experiences and operating data relating to the treatment, disposal and re-use of foul-condensate waters.

Articles of Reference Interest

"Ohio River Water Quality and Flow" — By Edward J. Cleary and David A. Robertson, Jr., *American Water Works Association Journal*, March, 1958, p. 399. Experiences of the Ohio River Valley Water Sanitation Commission in pioneering the establishment of a river-quality monitor program. Methods of operation, evaluation of data and costs are discussed.

"Creating Public Awareness and Motivation for Clean Streams" by Edward J. Cleary, *American Journal of Public Health*, June, 1959, p. 757. Analysis of methods used by ORSANCO to create public support to promote construction of waste-treatment facilities.

"Robot Monitor System for the Ohio Valley" — by Edward J. Cleary, *American Water Works Association Journal*, November, 1962, p. 1347. Story of pioneering efforts to establish electronic sentinels in the Ohio Valley.

"Reuse of Ohio River Water" — by Edward J. Cleary, Robert K. Horton, and Robert J. Boes, *American Water Works Association Journal*, June, 1963, p. 683. An investigation into reuse of Ohio River water, showing relationship of water used by industries and municipalities to river flow.

* Loan copies available.

Commission Movies

Following is a list of ORSANCO films produced to illustrate various aspects of pollution abatement in the Ohio Valley. These 16 mm movies, in color and with sound, may be borrowed for group showings by addressing the state agencies listed on the back cover, or by request to Commission headquarters.

GOOD RIDDANCE — This fast-moving, omnibus film depicts the progress made and the tasks that still remain in curbing water pollution in the Ohio Valley. The film offers a general introduction to the eight-state crusade for clean streams. (29½ minutes)

BEARGRASS CREEK — The story of what can happen to a stream when people along its banks disregard their obligation to prevent pollution. Of particular interest is the work being done by the University of Louisville in conducting the ORSANCO-sponsored study of aquatic-life resources. (19½ minutes)

OIL ON THE RIVER — Beginning with the story of the discovery of oil in the Ohio Valley, this film shows the unhappy consequence of carelessness in handling, transportation, storage and use of oil products and then depicts preventive measures. (20½ minutes)

CRISIS ON THE KANAWHA — A portrayal of industrial growth and the failure to keep pace with it in terms of river protection is the opening theme of this film. Then

follows a detailed description of remedial steps being taken. (22 minutes)

RIVER WATCHERS — Safeguarding streams from pollution hazards calls for constant vigilance. This is the story of the sentinels in the eight states who are engaged in checking sewage plant operations, aerial surveillance, virus identification, sampling of streams, forecasting river flow and evaluating the results from robot monitors. (18½ minutes)

THE FIRST FIFTEEN YEARS — ORSANCO commissioners describe progress in the fifteen-year crusade for clean streams in the Ohio Valley. A highlight of the film is a visit to The Kettering Laboratory where toxicity studies are documented. (26 minutes)

COAL AND WATER — A penetrating look at pollution problems created by the coal industry and steps being taken to solve those problems. Included is a description of sealing operations in an underground mine to curb acid mine-drainage. (23 minutes)

FINANCIAL REPORT

The following information relative to revenues collected and expenses paid, and statement of resources, was taken from the Audit Report of Wm. H. Mers and Company, Certified Public Accountants, for the year ended June 30, 1963.

OHIO RIVER VALLEY WATER SANITATION COMMISSION

STATEMENT OF REVENUES COLLECTED AND EXPENSES PAID YEAR ENDED JUNE 30, 1963

Revenues collected:

From signatory states:

State of Illinois	\$ 6,695.00
State of Indiana	22,945.00
Commonwealth of Kentucky	27,560.00
State of New York	1,430.00
State of Ohio	30,420.00
Commonwealth of Pennsylvania	20,215.00
Commonwealth of Virginia	4,875.00
State of West Virginia	15,860.00
	<u>\$130,000.00</u>

From U. S. Department of Health, Education and Welfare 108,238.00
(Grant by authority of Federal Water Pollution Control Act)

Sale of publications 226.75

Interest earned on bank deposit 2,731.58

Total revenues collected \$241,196.33

Expenses paid:

From state funds:

From authorized budget of \$156,000.00	\$143,019.17	
From \$7,630.50 encumbered at June 30, 1962	<u>7,630.50</u>	
		\$150,649.67

From federal funds:

From authorized budget of \$97,100.00	88,859.13	
From \$24,606.45 encumbered to June 30, 1962	<u>24,606.45</u>	
		113,465.58

Total expenses paid 264,115.25

Excess of expenses paid over revenues collected \$ 22,918.92

Note: The authorized budget for state funds in the amount of \$156,000.00 for the fiscal year ended June 30, 1963 consisted of appropriations received from signatory states during the fiscal year ended June 30, 1963 in the amount of \$130,000.00 and \$26,000.00 from available resources accumulated in prior fiscal years.

STATEMENT OF RESOURCES — JUNE 30, 1963

	State Funds	Federal Funds	Total
Available resources for period to June 30, 1962	\$ 63,367.19	\$ 24,646.51	\$ 88,013.70
Add: Revenues collected:			
Annual budget — July 1, 1962 to June 30, 1963	130,000.00		130,000.00
U. S. Department of Health, Education and Welfare		108,238.00	108,238.00
Sale of publications	226.75		226.75
Interest earned on bank deposit	2,731.58		2,731.58
	<u>\$196,325.52</u>	<u>\$132,884.51</u>	<u>\$329,210.03</u>
Less: Expenses paid:			
July 1, 1962 to June 30, 1963	150,649.67	113,465.58	264,115.25
Available resources for period to June 30, 1963 before encumbrances	45,675.85	19,418.93	65,094.78
Encumbered resources at June 30, 1963	13,150.00	16,200.00	29,350.00
Available resources at June 30, 1963 after encumbrances	<u>\$ 32,525.85</u>	<u>\$ 3,218.93</u>	<u>\$ 35,744.78</u>

The above amount of \$65,094.78 is comprised as follows:

Cash on deposit with The Central Trust Company — See Note	\$ 62,962.63
Cash on deposit with American Airlines, Inc.	425.00
Cash on deposit with Ohio Bureau of Workmen's Compensation	120.00
Petty cash on hand	200.00
Accounts receivable:	
Advances for employees:	
Employees' pension trust	\$ 1,196.45
Hospitalization	<u>190.70</u>
	1,387.15
	<u>\$ 65,094.78</u>

Note: Of the \$62,962.63 on deposit with The Central Trust Company at June 30, 1963, \$29,350.00 is encumbered.

MEMBERS OF THE COMMISSION

ILLINOIS

Maurice E. Gosnell, Gosnell & Benecki
Clarence W. Klassen, Chief Sanitary Engineer
Franklin D. Yoder, M.D., Director of Public Health

INDIANA

A. C. Offutt, M.D., State Health Commissioner
Blucher A. Poole, Stream Pollution Control Board
Joseph L. Quinn, Jr., The Hulman Company

KENTUCKY

Minor Clark, Department of Fish and Wildlife Resources
J. O. Matlick, Commissioner of Conservation
Russell E. Teague, M.D., State Health Commissioner

NEW YORK

Lyle W. Hornbeck, Bond, Schoeneck and King
Hollis S. Ingraham, M.D., State Health Commissioner
Joseph R. Shaw, Associated Industries of New York State, Inc.

OHIO

Emmett W. Arnold, M.D., Director of Health
Hudson Biery, Ohio Valley Improvement Association (ret.)
Barton Holl, Logan Clay Products Company

PENNSYLVANIA

Karl M. Mason, Department of Health
Marion K. McKay, Sanitary Water Board
Charles L. Wilbar, Jr., M.D., Secretary of Health

VIRGINIA

E. Blackburn Moore, State Water Control Board
William H. Singleton, State Water Control Board
Ross H. Walker, State Water Control Board

WEST VIRGINIA

N. H. Dyer, M.D., State Health Commissioner
W. W. Jennings, State Water Commission
Bern Wright, Division of Water Resources

UNITED STATES GOVERNMENT

Edwin E. Abbott, Corps of Engineers
Raymond E. Johnson, Fish and Wildlife Service
Luther L. Terry, M.D., Public Health Service

officers

Joseph R. Shaw, Chairman
Barton Holl, Vice-chairman
Fred H. Waring, Secretary
Verna B. Ballman, Treasurer
Edward J. Cleary, Executive Director and Chief Engineer
Leonard A. Weakley, General Counsel

staff

Edward J. Cleary, Executive Director and Chief Engineer
Robert K. Horton, Assistant Director
(Acting Director since April 1963)
William L. Klein, Chemist-Biologist
Robert J. Boes, Chemical Engineer
David A. Dunsmore, Assistant Engineer
Thomas R. Crabtree, Public Affairs Representative
Verna B. Ballman, Office Manager

Secretaries: **Ruth C. Bergmeyer**, **Alice F. Courtney**,
Jane W. Renaldo, **Grace B. Ziegler**

REGULATORY AGENCIES OF THE SIGNATORY STATES

Listed below are the names and addresses of the regulatory agencies in each of the signatory states. Inquiries concerning compliance with water-pollution control requirements should be addressed to the agency in the state in which the municipality or industrial plant is located. The state agency will arrange for such contact or consultation with the interstate commission as may be necessary or requested.

A compendium of interstate rules, regulations and standards that have been promulgated by the Ohio River Valley Water Sanitation Commission is available upon request.

ILLINOIS	Technical Secretary State Sanitary Water Board Springfield, Illinois
INDIANA	Technical Secretary Indiana Stream Pollution Control Board 1330 West Michigan Street Indianapolis 7, Indiana
KENTUCKY	Executive Director and Chief Engineer Kentucky Water Pollution Control Commission 275 East Main Street Frankfort, Kentucky
NEW YORK	Director Bureau of Water Resource Services Division of Environmental Health Services New York State Department of Health 84 Holland Avenue Albany 8, New York
OHIO	Chief Sanitary Engineer Division of Sanitary Engineering Ohio Department of Health Columbus 15, Ohio
PENNSYLVANIA	Sanitary Water Board Box No. 90 Harrisburg, Pennsylvania
VIRGINIA	Executive Secretary State Water Control Board 415 West Franklin Street Richmond 20, Virginia
WEST VIRGINIA	Executive Secretary State Water Resources Board 1709 Washington Street, East Charleston 1, West Virginia