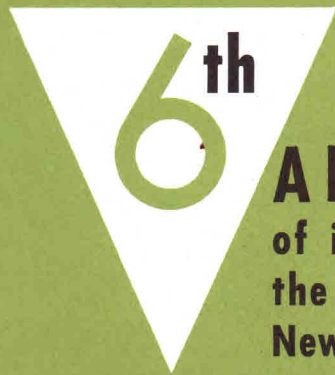


Ohio River Valley Water Sanitation Commission



ANNUAL REPORT, 1954

**of interstate pollution-control activities to
the Governors of Illinois, Indiana, Kentucky, Ohio,
New York, Pennsylvania, Virginia, West Virginia**

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OHIO RIVER VALLEY WATER SANITATION COMMISSION


To the Chairman and
Members of the Commission

To those concerned with reform movements -- and control of water pollution is a type of social reform -- six years is a short period when dealing with a problem that has been a half century or more in the making. The true reformer, of course, is one who is indoctrinated with the time sense of a geologist. Happily, geological time tables are not needed for measuring performance of the eight states signatory to the Ohio River Valley Water Sanitation Compact.

Perhaps the most significant index of progress, as revealed from this sixth report, is this: Sewage treatment facilities, in terms of population served have been installed at a rate four times faster than they were in a similar period prior to the establishment of the Commission. In fact, during the past year alone, the percentage increase of population served by treatment works was as great as that secured during the entire eight years prior to the signing of the compact.

Equally important, but not so dramatically tangible as the progress cited above, were developments in other phases of interstate action for pollution control. These are detailed in the accompanying report. Any satisfaction with what has been accomplished, however, should be tempered with sober reflection on the magnitude, as well as the complexity, of the tasks that lie ahead.

Respectfully submitted,


EDWARD J. CLEARY

December 1, 1954

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WHAT THE SIXTH YEAR SHOWS

• • • We are witnessing the greatest impetus ever experienced in the Ohio Valley in the completion, construction and planning of municipal sewage-treatment facilities. As depicted in the accompanying chart:

45% of the population has treatment facilities—a gain this year of 3%.

9% has treatment facilities under construction—a gain this year of 4%.

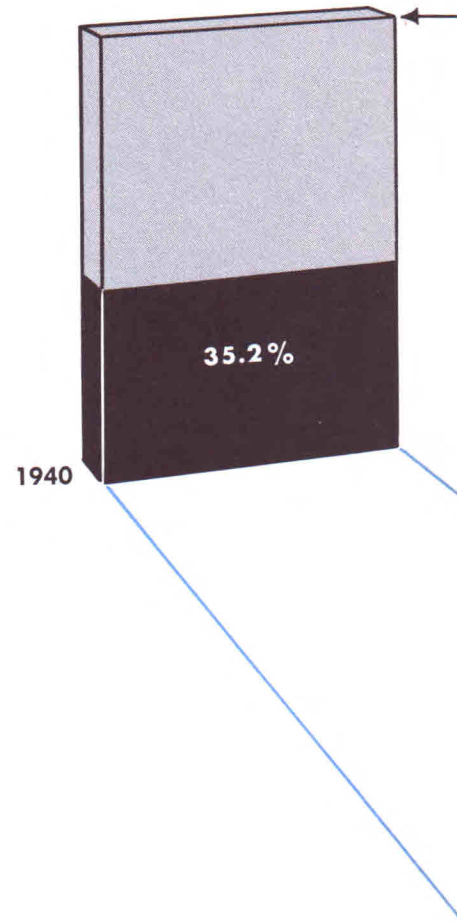
26% has received approval on construction plans—a gain this year of 10%.

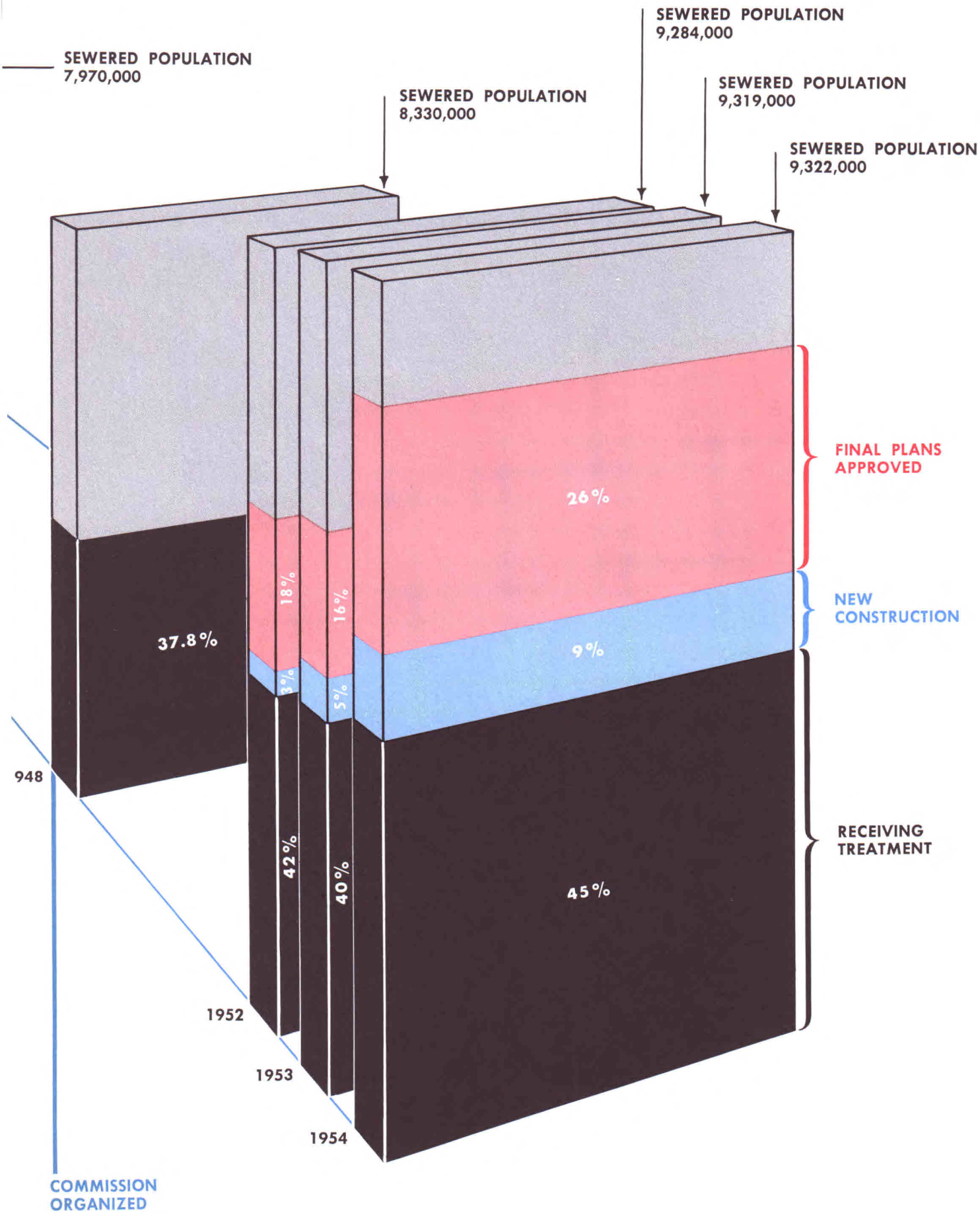
• • • Population served by sewage-treatment facilities during the past six years increased at a rate four times faster than was the case in a similar period prior to the establishment of the Commission.

• • • 30 percent of the 1,190 industries discharging directly into streams of the compact district are now rated by the state agencies as having adequate treatment and control facilities. Another 36 percent have provided some control, not all of which is considered adequate. There are 32 new installations under construction and plans for construction are in progress by another 129 industries.

• • • Investigations, public hearings and the promulgation of requirements for sewage discharges have been completed for the entire 981 miles of the Ohio River from Pittsburgh to Cairo.

• • • Assembly and evaluation of data pertaining to stream quality, flow variations and control measures has been greatly advanced, along with development of industry-committee relationships and the promotion of public interest and support. These and other activities are outlined in the following pages.





HOPES INTO REALITIES

When the eight governors and twenty-four commissioners of their choice affixed signatures to the Ohio River Valley Water Sanitation Compact on June 30, 1948, they had high hopes. They were of the belief that they were setting in motion a campaign for unified action and aggressive effort to arrest the degradation of water resources on a regional basis. In the six years that have elapsed since the ceremonial signing of this compact many developments have taken place to give assurance that "pious hopes and paper dreams" of the governors and their commissioners are being translated into reality.

Perhaps no development holds more meaning in terms of tangible accomplishment than the progress made in the compact district by the eight states in securing the installation of treatment facilities. Since the compact was signed there has been a four-fold increase in population served by treatment works—1,048,000 in six years as compared with only 227,000 for the entire eight years prior to 1948.

Probably of even greater significance are the new facilities currently under construction. Upon completion these plants will provide sewage treatment for an additional 860,000 people.

Substantial evidence that the future rate of construction of sewage-treatment works should continue to be as great—if not greater than that at present—is gained from the knowledge that final plans have been approved by the eight states to serve another 2,407,000 people in the district. Thus the backlog of new facilities approved for start of construction is three times that of work already underway.

These are among the important conclusions to be drawn from the detailed statistics provided by the accompanying status reports. And by reference to the chart on page 2 comparison can be made with what has taken place during the past two years. The picture is one of continued acceleration each year in the completion, construction and planning of sewage-treatment facilities.

The record speaks for itself. And the Commission

acknowledges with pride the efforts made by each of the eight states in the significant strides forward that have been made to safeguard water resources in the compact district.

What has been accomplished and what remains to be done are detailed in the account that follows.

OHIO RIVER HEARINGS

On December 9, 1953, the Commission held its final hearing with respect to requirements for sewage discharged into the Ohio River. And at its quarterly meeting on January 13 the Commission promulgated Treatment Standards No. 5, 6 and 7. These apply to three successive stretches of the river from below Cincinnati (mile-point 483) to Cairo (mile-point 981), a distance of 498 miles.

The conduct of investigations and public hearings with subsequent adoption of requirements for the entire 981 miles of the Ohio River marks the completion of a major task. The commission had ordained at almost its first meeting that the primary focus of attention should be the establishment of sewage pollution-control measures for the Ohio River. This reflected an appreciation that:

With a limited budget and staff, major emphasis should be centered on the interstate problem of widest concern;

Municipal sewage discharges were a potential health hazard to many water supply systems on the Ohio River;

The time lag for municipalities to comply with regulations probably would be greater than that for most industries.

On the basis of this decision studies were undertaken, supplemented by public hearings, which have since culminated in the adoption of seven standards or requirements for sewage treatment. Each of these is applicable to a specific stretch of the Ohio River in accordance with variations of stream flow, quantity of sewage and proximity of water-supply intakes to pollutional discharges. Details relating to the first four standards (covering the stretch from Pittsburgh to Cincinnati)

SUMMARY OF SIGNIFICANT CHANGES SINCE JULY, 1953, IN MUNICIPAL SEWAGE-TREATMENT STATUS

STATUS	Number of Communities (in color) and population served (in black)								TOTAL
	ILL.	IND.	KY.	N.Y.	OHIO	PA.	VA.	W. VA.	
New plants placed in operation	1 6,387	2 4,536	12 139,918	0 0	6(b) 167,761(c)	1 0	0 0	1 500	23(b) 319,102
Plant additions placed in operation	2 8,946	2 9,010	0 0	0 0	11 62,868	0 0	0 0	1 250	16 81,074
New plants placed under construction	1 8,732	7 169,692(a)	0 0	0 0	10(b) 504,836(d)	1 26,280	1 764	4 20,558	24(b) 730,862
Plant additions placed under construction	0 0	4 493,335	1 5,388	0 0	8 279,701	2 2,549	0 0	0 0	15 780,973
Final plans approved	0 0	3 43,203	3 20,586	0 0	5 55,205	60 1,024,543	0 0	2 4,985	73 1,148,522
TOTAL	4 24,065	18 719,776	16 165,892	0 0	39(e) 1,070,371	64 1,053,372	1 764	8 26,293	150(e) 3,060,533

(a) Includes 98,636 to be served by West Side plant at Evansville (b) Cincinnati included in both these categories (c) Includes 126,000 served by Little Miami plant at Cincinnati (d) Includes 451,502 to be served by Mill Creek plant at Cincinnati (e) Totals corrected; Cincinnati counted once

STATUS OF MUNICIPAL AND INSTITUTIONAL SEWAGE-TREATMENT FACILITIES—JULY 1, 1954

S T A T U S	Number of Communities (in color) and Population Served (in black)								TOTAL	% OF TOTAL
	ILL.	IND.	KY.	N.Y.	OHIO	PA.	VA.	W.VA.		
Adequate treatment	36 235,041	81 412,479	90 371,962	6 38,818	120 656,396	51 245,552	17 55,189	15 38,812	416 2,054,249	30.7 22.0
Treatment provided, not adequate	5 12,337	26 180,577	19 132,081	6 54,934	28 243,047	20 68,599	12 14,470	11 29,371	127 735,416	9.4 7.9
Treatment provided, not adequate; improvements or additional plants under construction	0 0	4 521,337(a)	1 5,388	0 0	20 818,634(b)	8 54,392	0 0	1 2,000	34 1,401,751	2.5 15.0
New treatment works under construction	1 8,732	7 171,690	0 0	0 0	6 547,583	5 32,329	2 2,769	6 96,259	27 859,362	2.0 9.3
Final plans approved	19 35,727	27 190,180	16 131,332	2 10,353	34 222,605	155 1,598,748	1 2,126	19 216,261	273 2,407,332	20.2 25.8
Final plans in preparation	0 0	3 19,701	1 369,129	0 0	11 351,101	16 63,176	2 7,583	6 126,316	39 937,006	2.9 10.1
Preliminary plans or report approved or in preparation	0 0	8 49,605	6 21,069	0 0	35 86,711	26 89,953	13 38,676	23 106,445	111 392,459	8.2 4.2
Treatment program under discussion	0 0	9 12,941	2 3,736	0 0	4 14,617	5 5,887	0 0	33 66,040	53 103,221	3.9 1.1
Order, notice or recommendation for treatment issued by state	0 0	3 4,219	0 0	0 0	0 0	6 23,454	11 18,958	14 18,293	34 64,924	2.5 0.7
Sewage discharged to stream by permit or law	0 0	0 0	0 0	0 0	0 0	13* 48,669	0 0	0 0	13 48,669	1.0 0.5
Pollution of minor significance	1 513	84 72,344	21 23,132	0 0	13 10,701	0 0	0 0	21 25,859	140 132,549	10.4 1.4
No action	4 18,419	16 58,366	20 55,221	0 0	27 27,069	0 0	1 1,000	19 24,947	87 185,022	6.4 2.0
TOTAL	66 310,769	268 1,693,439	176 1,113,050	14 104,105	298 2,978,464	305 2,230,759	59 140,771	168 750,603	1354 9,321,960	100.0 100.0
(a) Includes 30,000 served by East Side plant at Evansville (b) Includes 126,000 served by Little Miami plant at Cincinnati * Acid Stream law										

(a) Includes 30,000 served by East Side plant at Evansville
(b) Includes 126,000 served by Little Miami plant at Cincinnati
* Acid Stream law

are given on page 27 of the Fifth Annual Report or can be obtained by addressing the Commission; the other three standards (from Cincinnati to Cairo) are given on page 24 of this report.

Concurrent with the development of sewage-treatment requirements a basic study was inaugurated on bacterial-quality objectives. This resulted in the adoption by the Commission of recommendations to guide decisions on acceptable limits and control of bacterial contamination in the Ohio River. These yardsticks on bacterial quality, relating to both water supply and recreational uses of the river, served as one of the guides in the promulgation of sewage-treatment requirements.

The status of compliance by Ohio River municipalities with these standards for sewage treatment is detailed on succeeding pages. This reveals that during the past year:

Two plants were completed—Little Miami at Cincinnati and the Northern Kentucky Sanitation District plant serving Covington and 15 adjacent communities;

Four plants were placed under construction—Steubenville, Ohio, Cincinnati Mill Creek plant, Jeffersonville and Evansville, Ind. (Ironton, Ohio, continues under construction.)

Final plans approved—Pittsburgh and 67 adjacent communities, which are joined in the Allegheny County Sanitary District, and Conway, Pa.; McMechen and Glen Dale, W. Va.; New Boston and Portsmouth, Ohio; and Henderson, Ky.

At Louisville the approval of plans for sewage-treatment facilities was delayed by the desire of city officials to investigate the possibility of building three plants instead of one at a site below the city as originally pro-

posed. The Commission staff was asked by the Kentucky Water Pollution Control Commission to render an informal opinion covering additional treatment requirements since two of the proposed sites were in proximity to waterworks intakes on the Indiana side of the Ohio River. Staff findings submitted to the Kentucky Commission indicated that if these two sites were selected chlorination would be required. The Commission's original approval of Louisville's program with no provision for effluent chlorination had been based on the premise that sewage from the entire city would be treated and discharged well downstream from the water supply intakes in this area.

INDUSTRIAL WASTE CONTROL

As detailed on the adjoining page, the status of industrial-waste control installations reported by the state agencies for the 1,190 industries discharging directly into streams shows:

- 361 — or 30% — are rated as adequate
- 429 — or 36% — provide some form of control
not all of which is considered adequate
- 32 — new installations are under construction
- 129 — facilities are in the planning stage

Determinations by the Commission with regard to the need and adequacy of certain industrial-waste control facilities is contingent on the assembly of further data and the completion of investigations. These matters have occupied increasing attention, notably so since the completion of studies and hearings on Ohio River sewage-treatment requirements. The latter had been given top priority by the Commission and it claimed a large part of staff effort.

Among significant installations for the control of industrial wastes on the Ohio River are the following:

At Follansbee, W. Va., the **Koppers Company** has completed a phenol-waste treatment and recovery plant. The unit is reported to be capable of removing 99 percent of the phenol formerly discharged in a tar-process effluent. Built at a cost of half a million dollars, the new plant is based on several years of research. It incorporates two unique features, one relating to tray-tower design and the other to the use of a new solvent.

At Ambridge, Pa., the **Spang-Chalfant plant** of the **National Supply Company** has placed in operation a waste-water separation plant for the removal of mill scale, oil and grease. Primary clarifiers, secondary separators and a system of lagoons to handle 10 mgd are installed to take care of the present 5 mgd waste load and future expansion.

At Moundsville, W. Va., where the **Solvay Process Division of Allied Chemical and Dye Corporation** is completing construction of a chlorine-caustic soda plant, the industrial-waste control facilities include an earth-diked lagoon for removal of settleable solids from brine-purification muds and gas-scrubber slurry.

Commissioners Quinn (Ind.), Ward (Ky.) and Wisely (Ill.) who constituted the hearing board that met at Louisville on December 9, 1953.

Courier Journal and Louisville Times photo



At Willow Island, W. Va., **The American Cyanamid Company** has in operation two separate waste-control installations estimated to cost about \$600,000. A lagoon system with a capacity of 27 million gallons (10 days detention) handles all wastes except those from antibiotics production. The latter are treated in a high-rate trickling filter plant. Effluent from both the filters and lagoons is chlorinated before discharge.

At Aliquippa, Pa., the **Jones and Laughlin Steel Corporation** has completed installation of an \$800,000 treatment facility for the recovery of some 15 tons daily of flue dust formerly discharged into the river. Under construction at the same place, and also at a plant in the Pittsburgh area, are acid-waste treatment facilities estimated to cost \$1,500,000.

At Midland, Pa., the **Crucible Steel Company of America** has placed in operation a treatment plant for the recovery of some 120 tons daily of flue dust from its blast furnaces. This is the second stage of the company's pollution abatement program, a dephenolizing unit having been placed in operation three years ago. Total cost of the program is estimated at \$525,000.

At Weirton, W. Va., the **Weirton Steel Company** has under construction a flue dust and mill-scale recovery plant. This will remove some 120 tons daily of solids.

At Ironton, Ohio, the **Barrett Division, Allied Chemical and Dye Corporation**, has virtually completed the installation of an \$845,000 treatment plant for the removal of a phthalic-anhydride waste.

At Ashland, Ky., the **Semet-Solvay Division, Allied Chemical and Dye Corporation**, incorporated the following pollution-control features in the modernization of its by-product coke plant: Closed water recirculation in

the quenching station and in the ammonia liquor and wash-oil process; phenol recovery facilities; and a settling basin for treatment of lime waste.

At Louisville, Ky., the **Kentucky Synthetic Rubber Corporation** has installed recovery facilities for chemicals, rubber fines and styrene and has provided treatment for sewage. The cost was \$129,000. Evaluation of results from these controls will determine the need for additional pollution-abatement efforts.

At Owensboro, Ky., the new plant of the **Green River Steel Corporation** began operations with waste-control facilities installed. These include: Complete treatment of sewage; scale removal; and neutralization of pickle-liquor with storage in a lagoon.

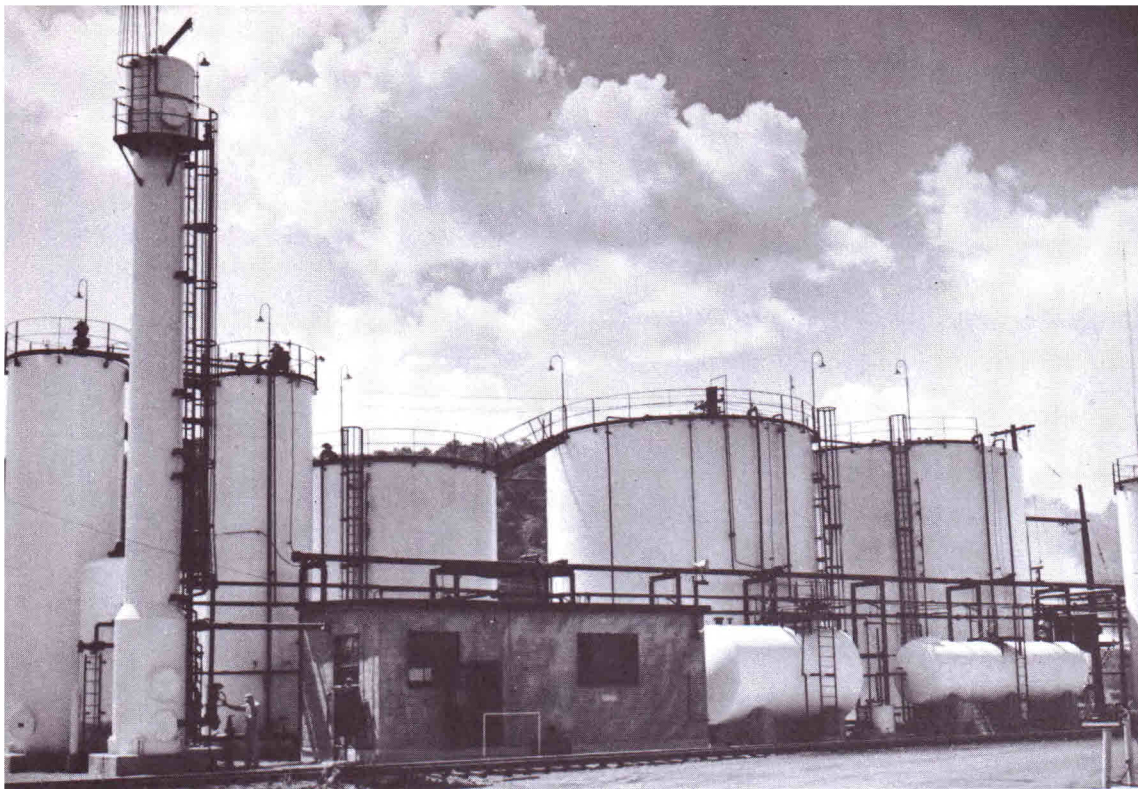
At Jeffersonville, Ind., the **Colgate-Palmolive-Peet Company** has effected thus far a 70 percent reduction in the population-equivalent strength of its waste load.

These examples highlight important aspects of industrial waste-control progress on the Ohio River. Equally important is the reduction of the pollution load from thousands of industries that discharge to municipal sewer systems connected to sewage disposal plants. For example, there are some 1,800 industries alone in the city of Cincinnati, the wastes from which will be treated along with domestic sewage.

INDUSTRY COMMITTEES—Some 150 representatives of industries in the Ohio Valley continue to serve the Commission in an advisory capacity through the activities of seven committees. These groups include experts from the steel, metal-finishing, chemical process, oil refining, coal, distillery and pulp and paper industries. The pulp and paper committee is a new group, its organization dating back only to June 22, 1954. The steel committee, oldest

STATUS OF INDUSTRIAL WASTE-CONTROL FACILITIES—JULY 1, 1954
for industries discharging wastes directly to streams

S T A T U S	ILL.	IND.	KY.	N. Y.	OHIO	PA.	VA.	W. VA.	TOTAL	% OF TOTAL
Treatment or control provided, facilities adequate	8	120	70	0	43	71	9	40	361	30.3
Treatment or control provided, facilities inadequate	2	44	44	19	136	13	0	35	293	24.6
Treatment or control provided, adequacy of facilities unknown	2	4	26	5	21	36	5	37	136	11.5
Control facilities inadequate, improvements under construction	0	0	2	0	1	1	0	0	4	0.3
New treatment or control facilities under construction	0	4	0	0	2	20	0	6	32	2.7
Plans for treatment or control facilities completed	0	2	0	0	2	10	0	1	15	1.3
Plans for treatment or control facilities in progress	0	11	3	0	5	82	1	12	114	9.5
Need for treatment or control facilities undetermined	0	11	0	1	3	25	7	57	104	8.8
Order for treatment or control issued by state	0	0	0	0	0	18	0	0	18	1.5
No action taken by company	0	3	0	2	0	7	10	91	113	9.5
Total number of industries reported	12	199	145	27	213	283	32	279	1190	100.0
Data pertains only to number of plants, without regard to type or volume of waste.										



Koppers Company phenol-waste treatment and recovery plant at Follonsbee, W. Va., built at a cost of half a million dollars. Placed in operation this year it is reported to remove 99 per cent of phenol formerly discharged in a tar-process effluent.

Robert E. Dick photo

in terms of organization, has been working with the Commission since April 1950.

A detailed summary of industry-committee purpose, organization and program was given in last year's annual report. Names and affiliations of industry-committee members are listed on pages 21-23 of this report. Highlights of this year's activity include:

STEEL COMMITTEE—An extensive sampling and analysis program for the Commission has been undertaken by steel companies along the Monongahela and upper Ohio rivers which promises to provide new information on the rates of natural reduction of phenol concentrations under varying conditions of temperature and stream flows. An endeavor is also being made to define with some accuracy the role of phenols in causing taste and odor problems at water-treatment plants. This work is being correlated with activities of the Water Users Committee.

Development work by several companies is being continued on methods for treating or removing phenols involving the use of new types of equipment and principles of application. An evaluation of these processes will be submitted to the Commission. Meantime, six procedures for handling spent pickling solutions have been evaluated by the committee on the basis of physical and economic limitations. Others are being similarly reviewed. Eventually a report with these findings will be made available to industry and state agencies.

Field studies are underway to aid the Commission in determining effects of ferrous-iron oxidation on the oxygen content in a stream. This information is particularly important in the Monongahela and upper Ohio rivers where steel manufacturing activities are centered.

From a survey of flue dust from steel plants the committee concluded that there was need for a better definition of settleable solids than that presently used. Rec-

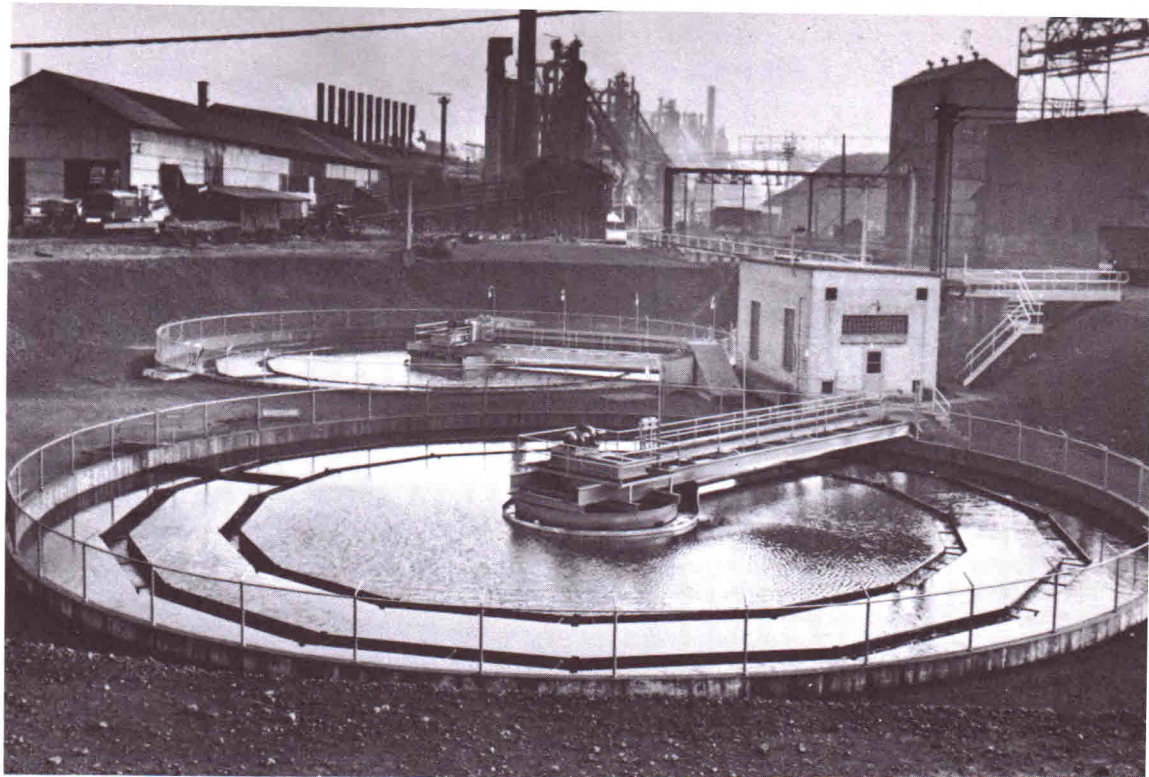
ommendations are being completed for a definition and procedure for measuring settleable solids in raw waste and for determining performance by equipment used to remove them. A report on physical and economic factors affecting removal of flue dust and solids is being readied for submission to the Commission.

Virtually completed is the draft of a manual on analytical procedures for measuring waste from steel plants. Methods were field-tested by the committee and final selection will be based on accuracy and reproducibility of results.

At the request of the committee the American Iron and Steel Institute is financing a literature review and abstract project at Mellon Institute on the effects of steel waste on subsequent water uses; financial support is also being provided for the Commission's toxicity evaluation project at The Kettering Laboratory.

METAL-FINISHING COMMITTEE—With the publication by the Commission of "Procedures for Analyzing Metal-Finishing Wastes" the committee has now completed a series of four manuals addressed to the entire industry. These practical handbooks tell how to measure flows, analyze waste effluents, reduce waste loads by good housekeeping and evaluate methods of waste treatment. The value of these manuals is evidenced by world-wide orders for copies.

Promotion of work on toxicity has continued, this being a field of endeavor in which the committee has pioneered. This activity has been supported solely by the National Cash Register Company—a member of the metal-finishing committee—and is estimated to have cost \$35,000 thus far. The effort forms an important part of the Commission's Kettering project and is also aiding the deliberations of the Commission's Aquatic Life Advisory Committee. The work is expediting development



Settling tank of the Jones and Laughlin Steel Corporation flue-dust recovery system at Aliquippa, Pa. This control facility includes sludge-dewatering and sintering equipment, the total cost of which is estimated at \$800,000.

of recommendations by The Kettering Laboratory on copper, lead, chromium, cyanides and related compounds.

The committee is also continuing its liaison activities to acquaint the nearly 2,000 metal-finishing plants in the Ohio Valley with pollution-control information it has developed.

OIL REFINING COMMITTEE—A survey of refineries located in the Ohio Valley has been made to determine the pollution load contributed from the industry. This activity resulted in formulating an outline of pollutants to be considered in a waste survey and the best available analytical procedures for measuring them. The survey has indicated the relative importance of different wastes and those that should command major attention.

Meantime, information is being summarized on disposal methods for spent caustic, phenol, foul condensate and oil—considered to be primary pollutants from refinery operations. The reports, containing plant operating data wherever possible, are supplied to the Engineering Committee of the Commission for information and to the American Petroleum Institute for further dissemination.

At the request of the committee the American Petroleum Institute has allocated \$12,500 for initiating work on toxicity evaluation, this effort to be correlated with the Commission's project at The Kettering Laboratory. This work will involve the abstracting and evaluating of available information on the effects of compounds in refinery waste on man, animals and aquatic life.

CHEMICAL INDUSTRY COMMITTEE—Because of similar interests and to prevent duplication of effort the Chemical Salts Committee merged this year with the Organic Chemicals Committee to form a single Chemical Industry Committee. The twenty-five companies represented on the committee include in their program of activities:

Methods of survey and analysis; evaluation of pollution loads; determination of the effects of low-flow augmentation; appraisal of methods of disposal of chemical wastes; examination of current practices for handling combined industrial and municipal sewage; determination of water-quality requirements for the manufacture and processing of chemicals; development of criteria for considering new plant site locations with respect to pollution control.

The committee has scheduled for early completion a manual dealing with the measurement and treatment of the pollutational properties of antibiotic waste.

With some water-treatment plants along the Ohio River experiencing foaming problems, the committee at the request of the Commission, undertook a program to determine whether detergents might be responsible. This project includes development of analytical procedures for detergents, an investigation of potential toxicity, a monitoring program to determine the level of detergents in the river and a study on methods of reducing detergents in sewage-treatment plants. Findings are being supplied to the Engineering Committee of the Commission and the work is correlated with activities of the Commission's Water Users Committee, the U. S. Public Health Service and a committee of the American Water Works Association.

COAL COMMITTEE—Prior to organization in 1951 of the Bituminous Coal Industry Advisory Committee, several representatives of that group as now constituted were providing financial support to research on control of acid mine-drainage. Reports from two of those projects are now available.

The summary report of the Mellon Institute research culminates six years of work sponsored jointly by the Pennsylvania Sanitary Water Board and coal-industry

associations. Aimed at an investigation of all aspects of the formation and occurrence of mine-acid and possible methods of control, the subject was pursued both in the field and in the laboratory. Although the investigation did not uncover what is considered to be a satisfactory or economical method for control of acid formation in underground mines, it did develop procedures by which acid formation and resultant stream pollution can be minimized during strip-mine operations.

The second report, "Drainage from Bituminous Coal Mines," West Virginia University Research Bulletin No. 25, summarized results of some nine years of intermittent research. This work was concerned primarily with the role of sulfur-oxidizing bacteria in mine-acid formation. The investigators reach the same conclusion as does the Mellon Institute, namely, there is no practical solution to the acid mine-drainage problem.

Meantime, the coal committee has kept in touch with development of a mine-acid control project sponsored by the Interstate Commission on the Potomac Basin with a research grant at The Johns Hopkins University. One member company—The Pittsburgh Consolidation Coal Company—made available one of its mine-workings for preliminary field tests of laboratory findings. Patent-application matters and a staffing problem have caused the sponsors to hold the project in abeyance.

The committee has undertaken a questionnaire study of practices in suspended solids removal at coal preparation plants. After considerable effort to obtain comparable data, the information has been tabulated for analysis and development of conclusions. Two conferences have been held with representatives of manufacturers of water-clarification equipment looking toward better methods for removal of suspended solids from washery waters.

JOINT SAMPLING COMMITTEE—Among the efforts to coordinate activities of the industry committees in the evaluation of analytical procedures, the Commission has sponsored a Joint Committee on Sampling Procedures with representatives from each of the industry committees, the U. S. Geological Survey and the signatory state water pollution control agencies. This committee is exchanging viewpoints on the applicability of procedures to the different industrial wastes and to stream analyses.

AQUATIC LIFE ADVISORY COMMITTEE

Noting, among other things, that one of its functions was to offer recommendations regarding quality of water suitable for fish life, the Aquatic Life Advisory Committee developed the following definition as a prerequisite to common understanding: "Waters capable of maintaining fish and other aquatic life shall be defined as those which produce a satisfactory fish crop as determined by quality of fish flesh, fish yield in pounds per acre, catch per man-hour, species composition, and standing populations."

The committee points out that materials that cause pollution and may affect the capabilities of maintaining

satisfactory conditions in waters as above described may be classified in three groups: inert; oxygen-consuming; and toxic. It should be recognized, says the committee, that there is probably no single body of water in any populated area that does not receive a pollutant of some form or quantity. The fish crop represents the end product of all of the biological processes in the aquatic habitat and is the only single group of animals that offers a variety of interests to man. If a satisfactory fish crop is produced, it may be considered that there are sufficient favorable factors at work to allow waters to be judged satisfactory to the important aquatic life.

The committee concludes that since the productivity of natural waters varies from area to area, a standard will of necessity have to be established for each water or portion thereof in question.

A recommendation on minimum oxygen requirements for maintenance of well-rounded fish populations and for the maintenance of a coarse fish population has been developed. These requirements recognize that average dissolved-oxygen values have little meaning and that a certain minimum oxygen concentration at all times is necessary to maintain a fish population. Recommendations on pH requirements and temperature are being evaluated.

The committee is also preparing a procedure-manual for state agencies and others outlining the observations to be made and data collected for the evaluation of the causes of fish kills.

CLEAN WATER RALLY

An important activity in the realm of promotion has been the Commission's interest in the conduct of appropriate ceremonies to mark the ground-breaking and completion of community sewage-treatment projects. In October 1953, a Clean Water Rally was held in Cincinnati to signalize the start of operation of one treatment works, partial completion of another and the ground-breaking for a third plant, the group of which would eliminate pollution from a total of 22 municipalities in the Greater Cincinnati area of Ohio and Kentucky.

Planned and executed by the City of Cincinnati, the Cincinnati Chamber of Commerce, the Northern Kentucky Sanitation District, the Commission and major industries in the so-called "Cincinnati Pool" of the Ohio River, the program captured the attention of President Eisenhower, the participation of two governors and the attendance of 400 civic and industrial leaders.

President Eisenhower in a congratulatory message said, "Stream sanitation in the Ohio Valley is a civic objective of tremendous importance to the whole nation. Your accomplishments are dramatic evidence of what can and will be achieved by unselfish community cooperation." Governor Frank J. Lausche of Ohio and Governor Lawrence W. Wetherby of Kentucky joined in pointing with pride to the accomplishments in their states which, as a result of local initiative, are halting the degradation of streams.

COMPLIANCE STATUS OF CITIES ON THE OHIO RIVER

During the past year the Commission completed a task that has commanded top priority since the inception of its program. That job was to make investigations, conduct public hearings and promulgate regulations for treatment of sewage entering the Ohio River. Adoption of Treatment Standards No. 5, 6 and 7 on January 13, 1954 was followed by the issuance of compliance notices to all municipalities, industries and institutions in the lower half of the 981 miles of the river.

The 155 municipalities along the river affected by these regulations are located in six states—Pennsylvania, West Virginia, Ohio, Kentucky, Indiana and Illinois. Securing local compliance with Commission requirements is the immediate responsibility of the respective state pollution-control agencies. The following tabulation shows current status of compliance. The status category is indicated by a number; the lower the number the greater the progress toward meeting requirements. Categories and their numbers are:

- | | | |
|--|-------------------------------------|--------------------------------------|
| 1. Adequate treatment | 4. Final plans approved | 8. Under state orders for compliance |
| 2. Treatment provided, not adequate | 5. Final plans in preparation | 9. Temporary permit issued by state |
| 3. Treatment plant or additions under construction | 6. Preliminary plans in preparation | 10. No sewerage system |
| | 7. Program under discussion | 11. No action |

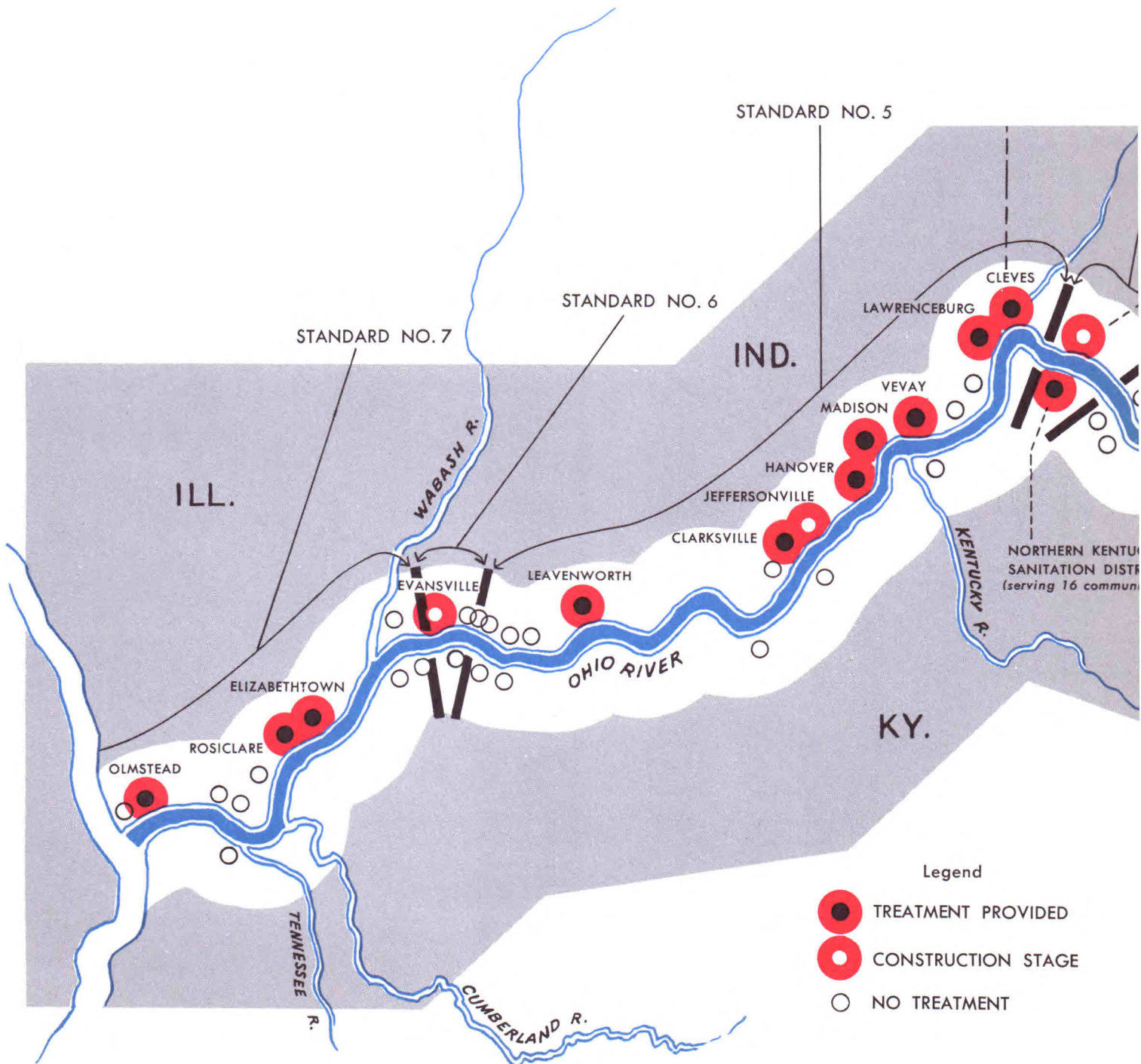
PLACE	STATE	MILE POINT	POP.	CATEGORY	PLACE	STATE	MILE POINT	POP.	CATEGORY
Pittsburgh	Pa.	0.0	676,806	5	East Liverpool	Ohio	43.5	24,217	4
Baldwin Twp.	"	3.0	10,743	5	Wellsville	"	47.6	7,854	6
Brentwood	"	3.0	12,535	5	New Cumberland	W. Va.	56.7	2,119	11
Mount Oliver	"	3.0	6,646	5	Toronto	Ohio	59.1	7,253	4
Castle Shannon	"	3.0	5,459	5	Weirton	W. Va.	62.0	24,005	4
Reserve Twp.	"	3.0	3,533	5	Steubenville	Ohio	68.0	35,872	3
Mt. Lebanon Twp.	"	3.0	26,604	5	Follansbee	W. Va.	70.6	4,435	7
Dormont	"	3.0	13,405	5	Mingo Junction	Ohio	71.0	4,464	9
Greentree	"	3.0	2,818	5	Brilliant	"	74.4	2,066	5
Ross Twp.	"		15,744	5	Wellsburg	W. Va.	74.4	5,787	6
McKees Rocks	"	3.0	16,241	5	Rayland	Ohio	81.6	726	1
Bellevue	"	4.0	11,604	5	Tiltonsville	"	83.0	2,202	6
Avalon	"	5.2	6,463	5	Yorkville	"	83.7	1,854	6
Stowe Twp.	"	5.3	12,210	5	Martins Ferry	"	88.8	13,220	6
Ben Avon Heights	"	5.6	394	5	Bridgeport	"	90.2	4,309	6
Ben Avon	"	5.7	2,465	5	Wheeling	W. Va.	90.5	58,891	4
Emsworth	"	6.2	3,128	5	Brookside	Ohio	91.0	845	6
Neville Twp.	"	7.0	2,310	4	Benwood	W. Va.	94.3	3,485	7
Glenfield	"	8.6	870	7	Bellaire	Ohio	94.5	12,573	6
Coraopolis	"	10.2	10,498	4	McMechen	W. Va.	96.2	3,518	4
Osborne	"	10.8	496	5	Shadyside	Ohio	97.6	4,433	6
Sewickley	"	11.8	5,836	5	Glen Dale	W. Va.	99.4	1,467	4
Edgeworth	"	12.9	1,466	5	Moundsville	"	101.9	14,772	4
Leet Twp.	"	14.5	1,905	7	Powhatan Point	Ohio	109.8	2,135	1
Allegheny Housing Auth.	"	14.5		6	New Martinsville	W. Va.	128.2	4,084	6
Leetsdale	"	14.8	2,411	5	Paden City	"	133.2	2,588	6
Ambridge	"	15.9	16,429	4	Sistersville	"	137.6	2,313	7
Harmony Twp.	"	18.0	912	4	Friendly	"	141.6	216	10
Aliquippa	"	20.0	26,132	4	New Metamoras	Ohio	142.0	781	9
Baden	"	20.3	3,732	4	St. Marys	W. Va.	155.0	2,196	11
Conway	"	21.6	1,570	4	Williamstown	"	172.0	3,837	6
Freedom	"	23.4	3,000	4	Marietta	Ohio	172.0	16,006	4
Rochester	"	24.4	7,197	4	Vienna	W. Va.	180.0	6,020	6
Monaca	"	24.4	7,415	4	Belpre	Ohio	183.9	2,451	6
Beaver	"	26.2	6,360	4	Parkersburg	W. Va.	184.6	29,684	4
Borough Twp.	"	27.0	2,750	4	Ravenswood	"	220.6	1,175	6
Fed. Housing Proj.	"	27.8		5	New Haven	"	245.5	969	6
Midland	"	36.5	6,491	4	Mason	"	250.2	924	11
Chester	W. Va.	43.3	3,758	7	Pomeroy	Ohio	250.3	3,656	4
					Middleport	"	252.1	3,446	4

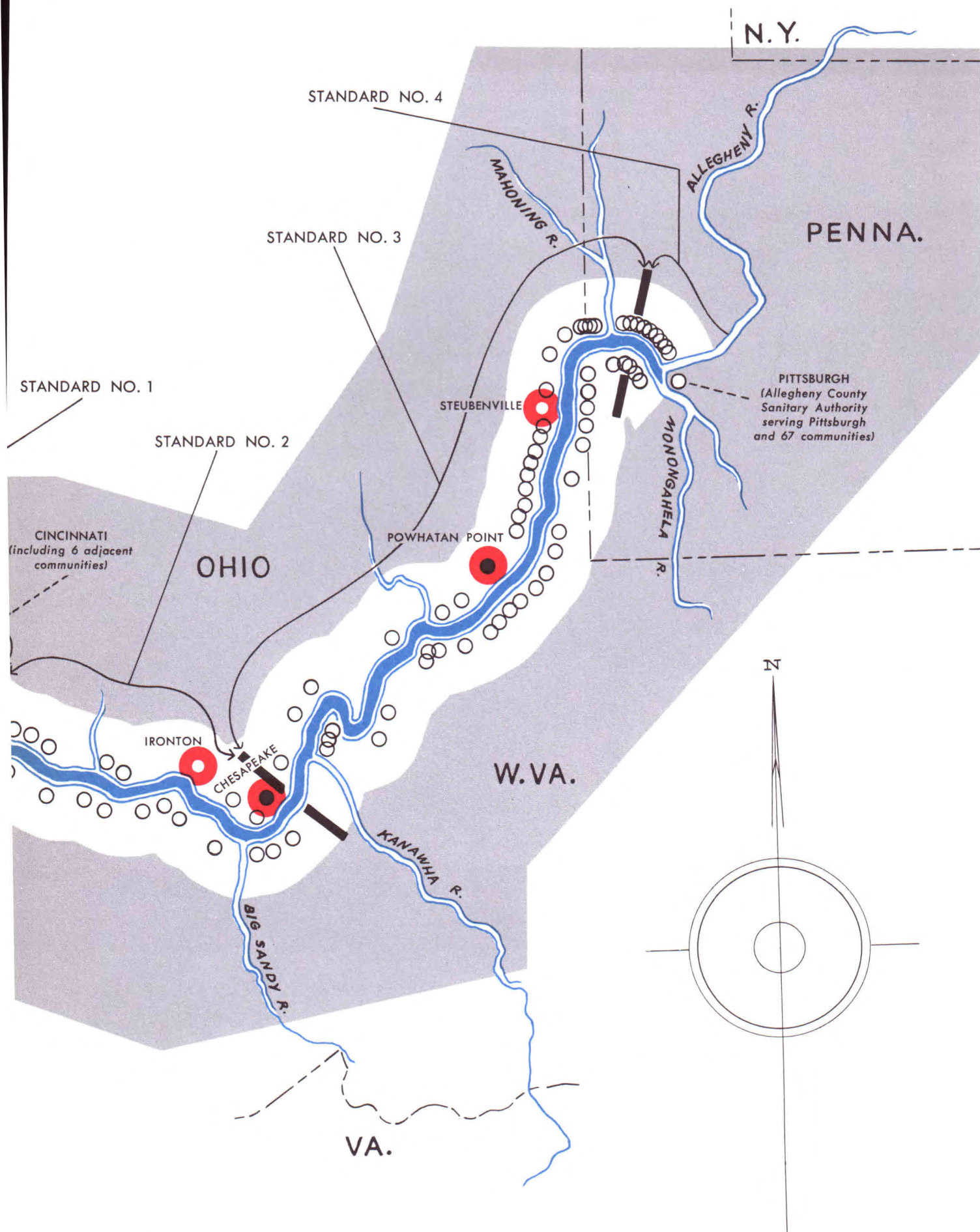
(continued on page 14)

ALONG THE OHIO RIVER

Regulations for municipal sewage-treatment discharges have now been established for the 981-mile length of the river, following investigation and public hearings that were completed this year. The regulations are set forth in seven standards, each of which applies to a different section of the river as shown.

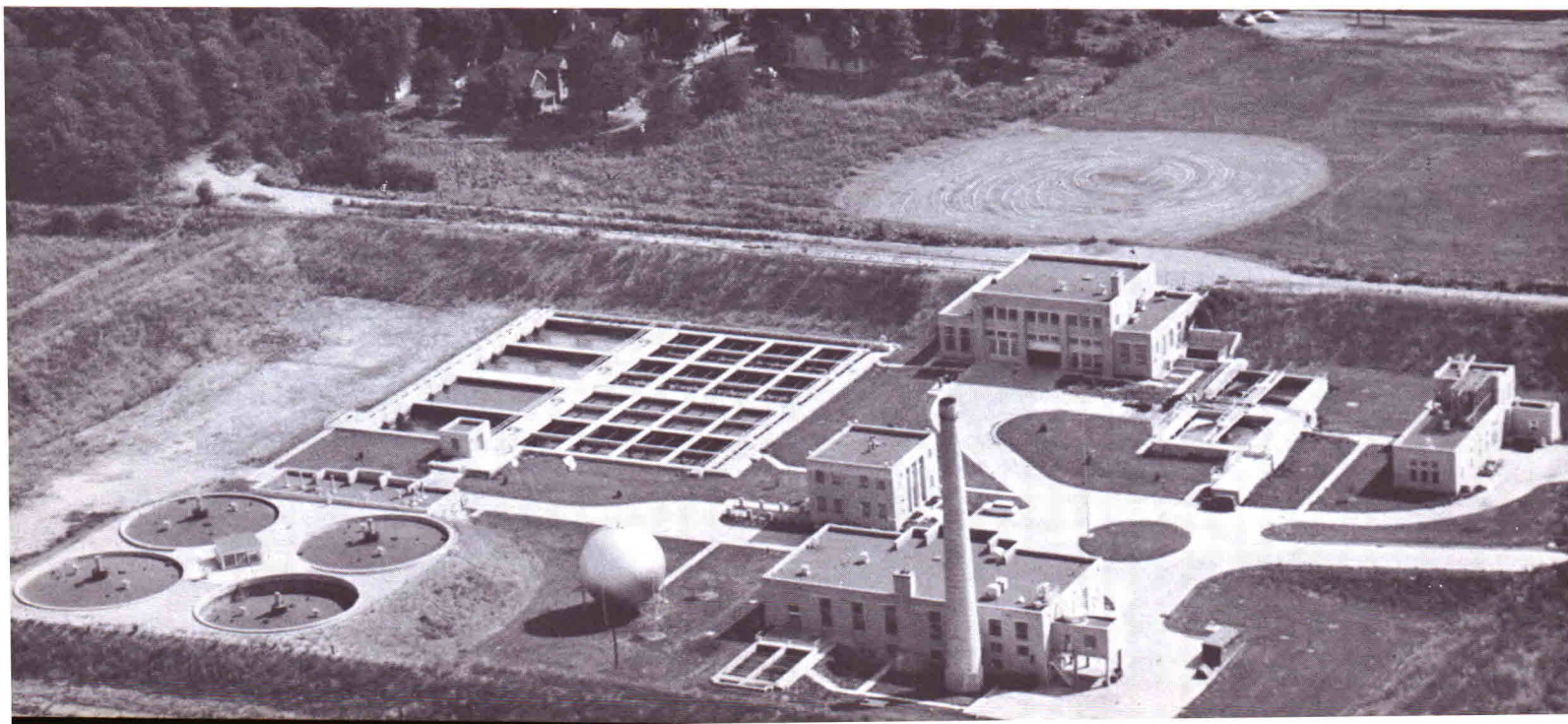
Location of the 155 municipalities affected by the regulations are shown by the indicated circles. Where treatment facilities are already completed or construction is underway the circle is colored. Compliance status of other municipalities is detailed in the tabulation on pages preceding and following the map.





PLACE	STATE	MILE POINT	POP.	CATE-GORY	PLACE	STATE	MILE POINT	POP.	CATE-GORY
Point Pleasant	W. Va.	265.2	4,596	5	Aurora	Ind.	496.5	4,780	5
Gallipolis	Ohio	269.7	7,871	4	Rising Sun	"	506.0	1,930	4
Proctorville	"	304.6	737	9	Warsaw	Ky.	528.1	6,625	11
Huntington	W. Va.	308.3	86,353	5	Vevay	Ind.	537.5	1,309	1
Chesapeake	Ohio	308.7	1,285	1	Carrollton	Ky.	545.6	3,226	4
Ceredo	W. Va.	314.8	1,399	7	Madison	Ind.	558.5	7,506	1
Kenova	"	315.7	4,320	7	Hanover	"	563.0	1,060	1
Catlettsburg	Ky.	317.2	4,750	6	Jeffersonville	"	604.0	14,685	3
Ashland	"	322.6	31,131	2	Louisville	Ky.	604.0	369,129	5
Coal Grove	Ohio	322.9	2,492	6	Vine Grove	"		1,252	1
Ironton	"	327.2	16,333	3	Clarksville	Ind.	606.0	5,905	1
Russell	Ky.	327.2	1,681	11	New Albany	"	609.5	29,346	4
Worthington	"	332.7	695	11	West Point	Ky.	630.2	1,669	11
Greenup	"	336.1	1,276	11	Hardinsburg	"		902	1
New Boston	Ohio	351.8	4,754	4	Leavenworth	Ind.	664.0	358	2
Portsmouth	"	356.0	36,798	4	Cannelton	"	724.0	2,027	4
Vanceburg	Ky.	377.9	1,528	11	Hawesville	Ky.	724.0	925	11
Manchester	Ohio	397.3	2,281	11	Tell City	Ind.	727.0	5,735	4
Aberdeen	"	408.4	551	9	Lewisport	Ky.	738.0	656	11
Maysville	Ky.	408.6	8,632	6	Rockport	Ind.	747.0	2,493	11
Ripley	Ohio	417.4	1,792	6	Owensboro	Ky.	757.0	33,651	4
Higginsport	"	424.6	385	6	Newburg	Ind.	778.0	340	11
Augusta	Ky.	427.0	1,599	11	Evansville	"	792.5	128,636	3
New Richmond	Ohio	449.9	1,960	6	Henderson	Ky.	804.0	16,837	4
Silver Grove	Ky.	459.4	859	11	Morganfield	"		3,257	1
Fort Thomas	"	462.9	11,640	1	Mount Vernon	Ind.	829.0	6,150	6
Southgate	"	465.0	1,903	1	Uniontown	Ky.	842.5	1,054	11
Dayton	"	467.8	8,977	1	Marion	"		2,375	1
Bellevue	"	468.8	9,040	1	Elizabethtown	Ill.	889.0	583	1
Newport	"	469.8	31,044	1	Rosiclare	"	891.5	2,086	1
Cincinnati	Ohio	470.0	503,998	3	Golconda	"	902.5	1,066	4
Covington	Ky.	470.5	64,452	1	Paducah	Ky.	935.0	32,828	4
Ludlow	"	472.5	6,374	1	Brookport	Ill.	937.5	1,119	11
Bromley	"	474.0	980	1	Metropolis	"	944.0	6,093	4
South Ft. Mitchell	"	474.0	3,140	7	Joppa	"	951.2	513	10
Cleves	Ohio	486.0	1,981	1	Olmstead	"	964.5	525	1
North Bend	"	486.3	711	5	Mound City	"	973.3	2,167	4
Lawrenceburg	Ind.	493.0	4,806	1	Cairo	"	979.0	12,123	11

First of four sewage treatment plants to serve Cincinnati, the Little Miami works was placed in operation in October, 1953. Providing sedimentation (with provision for chemical precipitation), sludge digestion and incineration, the plant has a capacity of 29 million gallons a day.



QUANTITY—QUALITY VARIATIONS OF OHIO RIVER WATER

Basic to the development of pollution-control requirements is a knowledge of minimum-flow patterns of a stream. Equally important in reaching conclusions is an understanding of quality conditions. Both of these matters are receiving special attention by the staff. A most unusual contribution to the success of these efforts is the service rendered voluntarily by the Commission's Water Users Committee in supplying twice-weekly analyses of Ohio River water at selected points.

Studies on the frequency of minimum or drought flows are based on records compiled by the U. S. Geological Survey. At present there are fifteen gaging stations on the Ohio River. For four of these—Sewickley, Huntington, Louisville and Metropolis—published records begin with 1934. Records for other stations were started at various times during the years 1936 to 1941.

These four stations were selected for studies of minimum-flow frequencies because: the records are the longest in time; and their location (extending almost from one end of the river to the other) is such as to divide the river into stretches of approximately equal length.

Curves were constructed for each station to show frequency of minimum-daily, minimum-weekly, minimum two-week and minimum-monthly flows. As the period of time over which flows are averaged is decreased, the minimum flow value is lessened. Thus, a minimum flow occurring once in five years is smaller in magnitude if it is computed on the basis of a daily average flow than it would be on the basis of a monthly average flow.

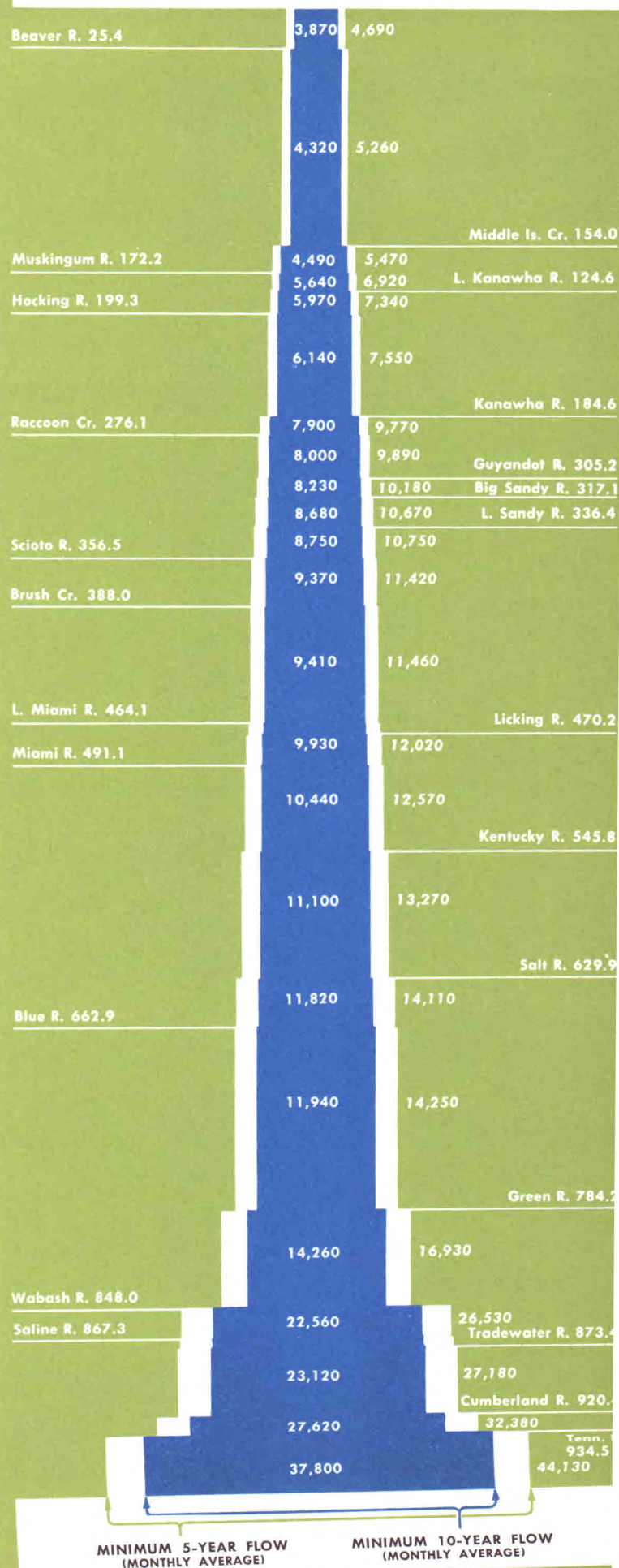
Flow-frequency curves were constructed by first arranging minimum flows for each year at each station in order of descending magnitude. The flows were then plotted against a percentage-of-time occurrence on a scale ranging from zero to 100 percent, the actual plotting position depending on the number of years of record.

The accompanying chart shows minimum monthly average flows that may be expected in the Ohio River at 5-year and 10-year intervals. Frequency curves showed, for example, that minimum 5-year flows were as follows: 4,690 cfs at Sewickley, 10,180 cfs at Huntington, 13,270 cfs at Louisville, 44,130 cfs at Metropolis. Flows at points between gages were determined by distributing the total increment in flow among the several tributaries on the basis of the ratio of drainage area of each tributary to the total difference in drainage area at the gages.

In developing the frequency data allowance was made for low-flow augmentation from multiple-purpose reservoirs on headwater streams. Past records were first adjusted upward to show what the runoff would have been if low-flow augmentation had been in effect at the time gagings were made. Adjusted flows were then used to construct frequency curves. Information on reservoirs that are now—or will have the potential of—augmenting low-flow was supplied by the U. S. Corps of Engineers.

Charts similar to the one given may be constructed to show flows of other types (daily, weekly and of varying frequencies—15-year flow, 20-year flow).

DROUGHT FLOWS—OHIO RIVER 5 and 10 YEAR FREQUENCIES



WATER QUALITY VARIATIONS

Following is a summary of quality conditions in the Ohio River based on two years of data supplied by the Water Users Committee from ten sampling stations. These stations are at: Weirton (mile 61.6); Beech Bottom (79.5); Yorkville (83.5); Wheeling (86.7); Natrium (119); Willow Island (161); Huntington (304); Portsmouth (350); Cincinnati (463); Louisville (601). Most analyses are made twice a week; some are made daily.

On the opposite page certain quality data and river flow are summarized in graphic form. The following comments will aid in an appraisal of these data.

River flow—The chart is based on data supplied by the U. S. Geological Survey for gages at Sewickley, Huntington, Cincinnati, Louisville and Metropolis.

It will be noted that 1953 was a drier year than 1952. Minimum monthly flows in 1953, which were in general 20 to 40 percent less than those in 1952, approached or exceeded in severity the drought flows that may be expected about once in 20 years.

Chloride—Chloride concentrations are fairly uniform in the river stretch between Weirton and Willow Island. Between Willow Island and Huntington there is an increase in chlorides such that concentrations at Huntington generally run 1.5 to 2.0 times greater than those in the Weirton area. Below the Huntington-Portsmouth section there is a gradual decrease in chlorides, showing that increasing dilution more than offsets any increment in concentration because of additional waste loads.

The general picture of chloride concentrations is as follows: In the Weirton-Willow Island section, yearly average concentrations are 25 to 30 ppm, with maximum monthly concentrations of 50 to 80 ppm; in the Huntington-Portsmouth area yearly figures are 40 to 45 ppm, and maximum monthly concentrations reach 110 to 125 ppm; at Louisville the chloride level is 30 to 35 ppm as a yearly average, with maximum monthly concentrations of 70 to 90 ppm. It may be pointed out that a chloride concentration of 120 ppm is within the range of taste sensitivity.

Hardness—Hardness concentrations appear to be fairly uniform for both years. A moderate increase in hardness is shown between Wheeling and Willow Island and a gradual decrease is apparent between the latter point and Louisville.

Hardness levels were as follows: Yearly average concentrations ranged from 120 to 170 ppm; and maximum monthly concentrations were 200 to 270 ppm. Although opinion varies regarding an objectionable level of hardness, certainly 200 ppm is well above the level at which water softening is considered desirable.

Sulfate—The sulfate picture is rather erratic in the upper part of the river from Weirton to Willow Island. With the exception of Wheeling, the stations in this section show higher concentrations than those downstream. Following a decrease in concentration below Willow Island, a leveling-off is apparent in the Cincinnati-Louisville stretch.

High concentrations in the upper river undoubtedly are caused by acid mine drainage together with other waste discharges. Dilution by tributaries obviously

occurs below Willow Island; however, below Cincinnati the effects of continuing dilution are no longer apparent.

The data show the following ranges of concentrations: Yearly averages of 100 to 230 ppm, and maximum monthly concentrations of 120 to 360 ppm.

Alkalinity—Concentrations are low in the upper river; in fact, on some days concentrations of zero were observed. Low alkalinity here obviously shows the effect of acid mine drainage and industrial waste discharges.

Tributary streams serve to dilute and neutralize the acid in the upper river, so that there is a continuing rise in alkalinity in the Ohio River downstream to Louisville. Alkalinity concentrations at Weirton are 5 to 15 ppm; at Louisville concentrations range from 40 to 60 ppm.

In general, alkalinity concentrations were lower in 1953 than in 1952. This tendency apparently shows the influence of reduced stream flows in 1953.

Coliforms—The coliform charts show maximum concentrations at Wheeling, a sharp decline between Wheeling and Huntington, an increase below Huntington and then a rather gradual decrease in concentrations below Portsmouth. Maximum concentrations at Wheeling exceeded 100,000 coliform organisms per 100 milliliters.

At three stations—Huntington, Cincinnati and Louisville—the averages of the monthly concentrations for both 1952 and 1953 were less than the Commission's quality objective of 5,000 coliforms per 100 milliliters. Only at Huntington—and only in 1952—was the maximum monthly concentration below this objective.

During the two years there was only one month at Wheeling—and only three months at Weirton—in which monthly average concentrations were less than 5,000. The picture downstream was much more favorable. At the downstream stations the number of months in the two-year period showing coliform concentrations less than 5,000 were as follows: at Huntington 22, at Portsmouth 6, at Cincinnati 17, at Louisville 15.

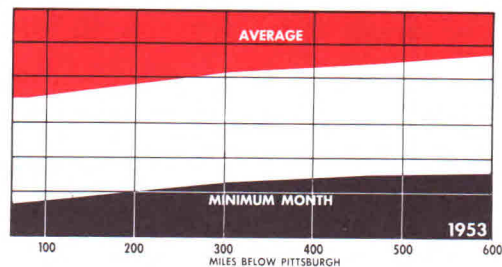
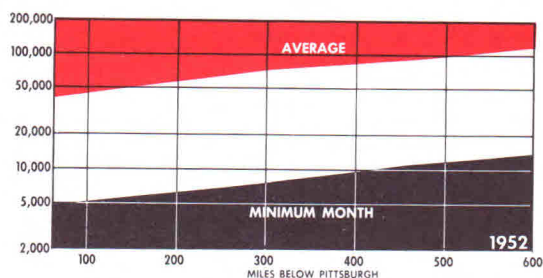
Temperature—Data (not plotted) show that the range in temperature throughout a yearly period is very nearly the same at all stations. In 1952 and 1953 maximum temperatures occurred in July or August, and for all stations were between 73 deg. F and 83 deg. F (monthly average). Minimum temperatures occurred in January or February, and for all stations were between 36 deg. F and 45 deg. F (monthly average).

Additional data—The contribution by the Water Users Committee in supplying analytical data becomes of increasing value as time goes on. Recognizing the importance of this water-quality monitoring the Commission will inaugurate a supplementary sampling and analytical project in cooperation with the U. S. Geological Survey and the U. S. Corps of Engineers on October 1, 1954.

This project will provide information on quality conditions in the Ohio River at five additional sampling stations and will include analyses for a number of constituents on which information previously has been lacking. These include: iron, manganese, calcium, magnesium, sodium, potassium, aluminum, fluoride, nitrate, phosphate, silica.

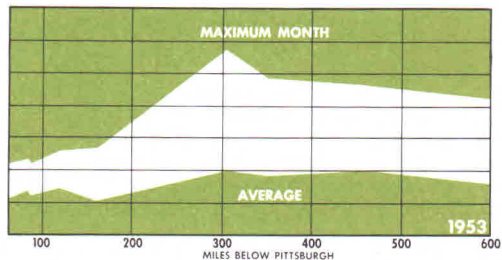
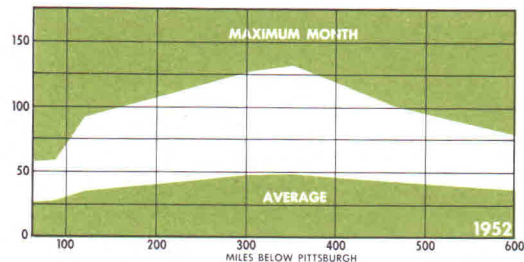
RIVER-FLOW

CUBIC FEET PER SECOND



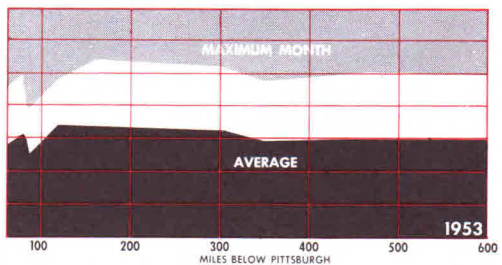
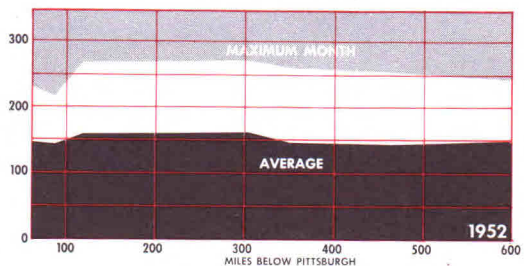
CHLORIDE

CONCENTRATION, PPM



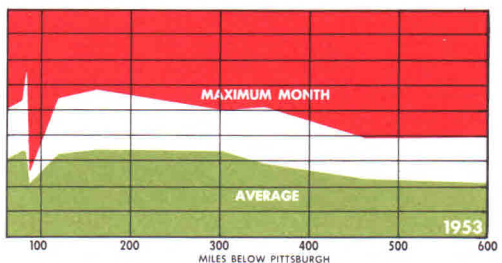
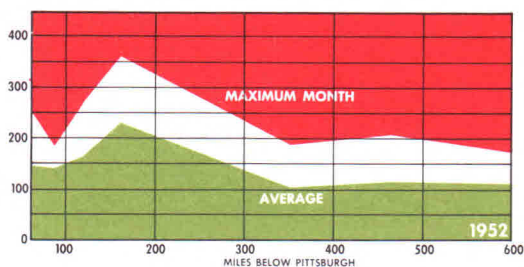
HARDNESS

CONCENTRATION, PPM



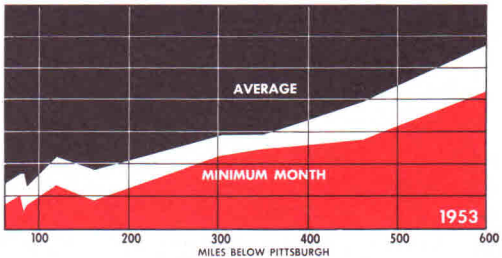
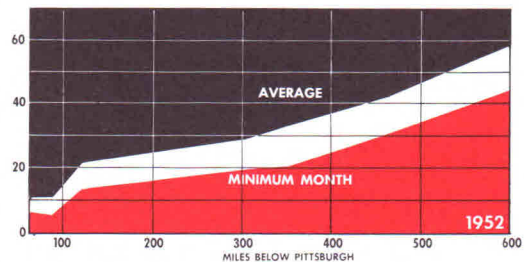
SULFATE

CONCENTRATION, PPM



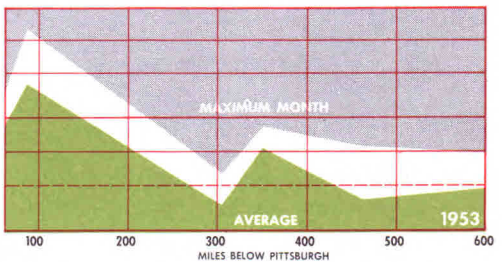
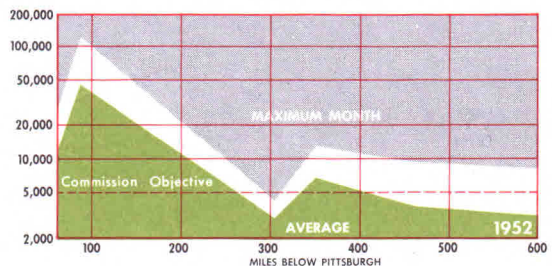
ALKALINITY

CONCENTRATION, PPM



COLIFORMS

MPN PER 100 ML



WATER QUALITY AND FLOW VARIATIONS IN THE OHIO RIVER — 1952 AND 1953

OHIO RIVER VALLEY WATER SANITATION COMMISSION

STATEMENT OF RECEIPTS AND DISBURSEMENTS

Year Ended June 30, 1954

STATEMENT OF RECEIPTS AND DISBURSEMENTS

RECEIPTS:

From signatory states.....	\$100,000.00
Interest earned on bank deposit.....	214.60
Sale and handling of publications.....	1,545.86
Total receipts	<u>101,760.46*</u>

DISBURSEMENTS:

Salaries	\$58,036.10
Contractual services	153.79
Dues and subscriptions	392.84
Telephone and telegraph....	1,788.17
Printing	4,615.22
Office supplies	1,406.24
Postage	911.19
Meetings	1,515.07
Travel—commissioners	4,796.37
Travel—staff	6,312.76
Travel—advisory committees	776.81
Electric and water.....	630.19
Insurance	10.00
Office rent	7,089.60
Miscellaneous	639.22
General office equipment and furnishings	724.66
Legal services	3,600.00
Auditing	550.00
Consulting services	4,400.00
Maintenance and repairs....	739.93
Employees pension trust....	4,397.78
Social security tax.....	647.84
Research:	
University of Cincinnati (Kettering Laboratory)	5,000.00
Total disbursements	<u>\$109,133.78</u>
Excess of disbursements over receipts.....	<u>\$ 7,373.32</u>

*NOTE: The total receipts of \$101,760.46 shown above does not include an amount of \$21,720.00 received from signatory states during the twelve months ended June 30, 1954, which is applicable to their contribution for the twelve months ended June 30, 1955.

STATEMENT OF UNUSED RESOURCES

June 30, 1954

Unused resources	
June 30, 1953.....	\$ 42,569.86
Add: Annual budget—	
July 1, 1953 to	
June 30, 1954.....	100,000.00
Interest earned on	
bank deposit	214.60
Sale and handling	
of publications	1,545.86
	<u>\$144,330.32</u>
Less: Disbursements	
July 1, 1953 to	
June 30, 1954.....	<u>109,133.78</u>
Unused resources for period	
to June 30, 1954.....	\$ 35,196.54
Add: Receipts from signatory states	
covering period of twelve	
months ending June 30, 1955.....	<u>21,720.00</u>
Unused resources June 30, 1954.....	<u>\$ 56,916.54</u>

The above amount of \$56,916.54 is comprised as follows:

Cash on deposit with the	
Central Trust Company.....	\$ 55,823.32
Petty cash on hand.....	200.00
Cash on deposit with	
American Airlines, Inc.....	425.00
Advances for employees.....	468.22
(Hospitalization expense and employee	
pension trust contributions are advanced	
by the Commission and repaid by the em-	
ployees through regular semi-monthly pay-	
roll deductions.)	
	<u>\$ 56,916.54</u>

SCHEDULE OF RECEIPTS FROM SIGNATORY STATES—YEAR ENDED JUNE 30, 1954

	*Annual Budget July 1, 1953 to June 30, 1954	Annual Budget July 1, 1954 to June 30, 1955	Total
State of Illinois.....	\$ 5,150.00	\$ 450.00	\$ 5,600.00
State of Indiana.....	17,650.00	5,295.00	22,945.00
Commonwealth of Kentucky.....	21,200.00	300.00	21,500.00
State of New York.....	1,100.00	330.00	1,430.00
State of Ohio.....	23,400.00	7,020.00	30,420.00
Commonwealth of Pennsylvania.....	15,550.00	4,665.00	20,215.00
Commonwealth of Virginia.....	3,750.00		3,750.00
State of West Virginia.....	12,200.00	3,660.00	15,860.00
TOTALS	<u>\$100,000.00</u>	<u>\$ 21,720.00</u>	<u>\$121,720.00</u>

*These figures are in accordance with revised formula for state contributions based on 1950 census figures.

In our opinion, the accompanying statement of receipts and disbursements, statement of unused resources, and schedule of receipts from signatory states present fairly the operations of the commission on a receipts and disbursements basis for the fiscal year ended June 30, 1954, and its financial condition on June 30, 1954.

Wm. H. Mers & Co., Certified Public Accountants



Officers of the Commission include: R. K. Horton, treasurer; W. W. Jennings, chairman; Earl Devendorf, vice-chairman; F. H. Waring, secretary; Edward J. Cleary, executive director; and H. E. Moses, past-chairman.

Pittsburgh Press photo

COMMISSIONERS AND COMMITTEES

Administration of the compact for "faithful cooperation in the control of future pollution and abatement of existing pollution" is delegated to a commission of 27 members. On this commission each state has three representatives appointed by the Governor of the state. The federal government also has three representatives appointed by the President of the United States. Commissioners serve without compensation.

Funds for operation of the Commission are appropriated by the states in accordance with a compact provision that says: "The signatory States agree to appropriate for the salaries, office and other administrative expenses, their proper proportion of the annual budget as determined by the Commission and approved by the Governors of the signatory States, one-half of such amount to be prorated among the several States in proportion to their population within the District at the last preceding

Federal census, the other half to be prorated in proportion to their land area within the District."

For the first year the states appropriated on the basis of a \$40,000 budget; in each of the five succeeding years the budget was \$100,000. For the coming year the budget is \$130,000. Financial details are given on the page opposite.

Conduct of Commission affairs and execution of policy is carried out by a salaried staff. At present the staff numbers nine—four engineers and five office assistants. A legal counsellor is retained by appointment as is also an engineer consultant.

A listing of the officers, the commissioners and the staff is given on the front inside cover of this report. Two new commissioners took office this year—Mr. Earl Devendorf of New York was appointed to fill the vacancy created by the resignation of Mr. Charles McCabe; Mr.

IN MEMORIAM

With profound sorrow the Ohio River Valley Water Sanitation Commission records the death on November 17, 1953, of Federal Commissioner Robert G. West.

Mr. West's deep interest in the Ohio River and the affairs of this Commission was evidenced early in the life of the Commission. It was through his influence and cooperation that the first office of the Commission was completely furnished early in September, 1948, when the Corps of Engineers supplied on loan

every necessity to initiate operation of the compact. Mr. West was ever ready to assist in the campaign for clean streams with his good counsel and by making available his knowledge and experience on hydrologic matters.

With the sense of our loss is mingled deep sympathy for the members of his family.

(This resolution was passed at the quarterly meeting of the Commission on January 13, 1954.)



Edwin E. Abbott was made a federal commissioner following the death of Mr. Robert G. West.

The chairman and vice-chairman are elected by the members of the Commission to hold office for one year. During the fiscal year 1953-1954 Dr. H. E. Moses of Pennsylvania served as chairman and Mr. W. W. Jennings of West Virginia was vice-chairman. Mr. Jennings was elected to become chairman on July 1, 1954 and Mr. Earl Devendorf of New York took office as vice-chairman.

Mr. Jennings has been a member of the Commission since its establishment. He is an industrial executive and leader in water-resources development and conservation practice. One of the first members appointed to the West Virginia Water Commission in 1946 he continues to serve as a member of that agency, having held the chairmanship during the period of 1948-49. Mr. Jennings is general superintendent of the Electro Metallurgical Co., a

division of the Union Carbide and Carbon Corporation in Alloy, W. Va. A chemist by profession, he began his career with the company in 1912.

Committee Activities—Certain functions of the Commission are conducted with the aid of standing committees, the names and composition of which are shown in the accompanying list. The Engineering Committee is the only one not restricted to members of the Commission, it being composed of the executive engineer officers of the eight-state pollution-control agencies.

Special committees to advise or otherwise aid the Commission, have been established from time to time. These include seven industry groups, an aquatic-life specialist committee and a water-users committee. Their activities are detailed in other sections of this report. The names and composition of these committees is given in the following pages.

COMMITTEE ASSIGNMENTS

(for year ending June 30, 1955)

Engineering

B. A. POOLE, *Chairman*
LOUIS F. BIRKEL
EARL DEVENDORF
HARRY K. GIDLEY
C. W. KLASSEN
EDGAR LANDENBERGER
O. LLOYD MEEHEAN
H. E. MOSES
A. H. PAESSLER
W. W. TOWNE
F. H. WARING

Audit

E. A. HOLBROOK, *Chairman*
JOSEPH L. QUINN, JR.
ROSS H. WALKER

Executive Committee

Chairman —W. W. JENNINGS
Past-Chairman —H. E. MOSES
Illinois —CLARENCE W. KLASSEN
Indiana —JOSEPH L. QUINN, JR.
Kentucky —HENRY WARD
New York —EARL DEVENDORF
Ohio —HUDSON BIERY
Pennsylvania —E. A. HOLBROOK
Virginia —T. BRADY SAUNDERS
West Virginia —HARRY K. GIDLEY
Federal —O. LLOYD MEEHEAN

By-Laws

HUDSON BIERY, *Chairman*
H. E. MOSES
W. H. WISELY

Finance

KENNETH M. LLOYD, *Chairman*
EARL DEVENDORF
HENRY WARD

Interstate Relations

HENRY WARD, *Chairman*
HUDSON BIERY
RUSSELL E. TEAGUE

Pension Trust

ROSS H. WALKER
CLARENCE W. KLASSEN
ROBERT K. HORTON

CALENDAR OF MEETINGS

JULY, 1953 6—Metal-Finishing Committee—Charleston, W. Va.
7—Joint Meeting of Commission and Industry Committee Representatives—Charleston, W. Va.
8—Commission—Charleston, W. Va.

SEPT., 1953 10—Joint Sampling Committee—Columbus
15—Steel Committee—Cleveland
24—Organic Chemical Committee—Cincinnati*

OCT., 1953 6—Clean Water Rally—Cincinnati
6—Engineering Committee—Cincinnati
7—Commission—Cincinnati
9—Oil Refining Committee—Pittsburgh
13—Joint Sampling Committee—Columbus
22—Water Users Committee—Cincinnati
28—Metal-Finishing Committee—Cincinnati

NOV., 1953 17—Steel Committee—Pittsburgh
19—Organic Chemical Committee—Cincinnati*
24—Joint Sampling Committee—Columbus

DEC., 1953 14—Coal Committee—Pittsburgh
16—Metal-Finishing Committee—Cincinnati

JAN., 1954 12—Engineering Committee—Cincinnati
13—Commission—Cincinnati
19—Joint Sampling Committee—Columbus

JAN., 1954 21—Water Users Committee—Huntington, W. Va.
22—Oil Refining Committee—Cleveland
25—Aquatic Life Committee—Cincinnati
26—Steel Committee—Chicago

FEB., 1954 10—Coal Committee—Columbus, Ohio
11—Chemical Industry Committee—Cincinnati

MAR., 1954 22—Steel Committee—Pittsburgh
23—Engineering Committee—Pittsburgh
24—Commission—Pittsburgh

APRIL, 1954 6—Joint Sampling Committee—Columbus
8—Chemical Industry Committee—Cincinnati
21—Metal-Finishing Committee—Cincinnati
29—Water Users Committee—Cincinnati

MAY, 1954 7—Coal Committee—Chicago
9—Aquatic-Life Committee—Cincinnati
18—Steel Committee—Pittsburgh

JUNE, 1954 4—Water Users Committee—Wheeling, W. Va.
11—Oil Refining Committee—Louisville, Ky.
22—Pulp and Paper Committee Organization Meeting—Cincinnati
24—Chemical Industry Committee—Cincinnati
29—Steel Committee—Pittsburgh

*Chemical Salts Committee and Organic Chemical Committee merged to become the Chemical Industry Committee on February 11, 1954.

INDUSTRY-ACTION AND ADVISORY COMMITTEES

STEEL INDUSTRY COMMITTEE

ALLEGHENY-LUDLUM STEEL CORP.
P. R. Bish
Emil Kern

ARMCO STEEL CO.
Michael Dannis*
Grant A. Pettit
(Chairman 1953-54)

BETHLEHEM STEEL CO.
R. F. Pullen

COPPERWELD STEEL CO.
Joseph W. Kennedy

CRUCIBLE STEEL COMPANY OF AMERICA
George E. Muns

EMPIRE STEEL CORP.
John W. Hill

INLAND STEEL CO.
Ross Harbaugh

JONES AND LAUGHLIN STEEL CO.
G. M. Dreher
(Co-chairman)

PITTSBURGH COKE AND CHEMICAL CO.
Richard Huling

PITTSBURGH STEEL CO.
Walter B. Farnsworth
Edward J. Roehl

REPUBLIC STEEL CORP.
Ralph Drews
R. H. Ferguson
Earl Smith

SHARON STEEL CORP.
C. W. Wessner

U. S. STEEL CORP.
C. A. Bishop
(Chairman 1954-55)
G. A. Howell
R. M. Smeaton*

WEIRTON STEEL CO.
Joseph Sample
J. H. Strassburger

WHEELING STEEL CORP.
H. A. Stobbs

YOUNGSTOWN SHEET AND TUBE CO.
DeYarman Wallace

B. A. POOLE
Commission liaison member

J. E. KINNEY
Committee coordinator

*Member only of subcommittee

METAL-FINISHING COMMITTEE

AMERICAN RADIATOR AND
STANDARD SANITARY CORP.
Burton Van Dyke

ARVIN INDUSTRIES, INC.
C. L. Prichard

COLUMBUS METAL PRODUCTS, INC.
William J. Neill

ELECTRIC AUTO-LITE CO.
Allan M. Reed
(Vice-chairman)

GENERAL ELECTRIC CO.
C. M. Fair
K. S. Watson

GENERAL MOTORS CORP.
Hubert S. Kline

HAMILTON MANUFACTURING CORP.
Walter Miller

HOUDAILLE-HERSHEY CORP.
W. L. Pinner
W. H. Toller, Jr.

NATIONAL CASH REGISTER CO.
R. G. Chollar
(Chairman 1953-54)
L. J. Hibbert
(Chairman 1954-55)

ROCKWELL SPRING AND AXLE CO.
C. C. Cupps

TALON, INC.
Harry W. McElhaney

WESTINGHOUSE ELECTRIC CORP.
Harold Farber

F. H. WARING
Commission liaison member
J. E. KINNEY
Committee coordinator

CHEMICAL INDUSTRY COMMITTEE

ALLIED CHEMICAL AND DYE CORP.
Austin Heller
(Vice-chairman)

R. W. Hess
Bates Torrey, Jr.

AMERICAN CYANAMID CO.
L. L. Hedgepeth
Harry W. Pitts
John F. Vogler

AMERICAN VISCOSE CORP.
G. M. Neas

BAKELITE CO.
J. R. Yount

CARBIDE AND CARBON CHEMICALS CO.
George F. Jenkins
(Chairman 1953-54)
O. C. Thompson

CELANESE CORPORATION OF AMERICA
L. W. Rosnoy

CINCINNATI CHEMICAL WORKS
James Crane

COLUMBIA-SOUTHERN CHEMICAL CORP.
W. R. Harris
I. A. Neubauer
Robert E. Widing

COMMERCIAL SOLVENTS CORP.
Don E. Bloodgood
Hans Fischer

DIAMOND ALKALI CO.
U. T. Greene
W. R. Taylor

E. I. DUPONT DE NEMOURS AND CO.
R. A. Briggs
A. C. Hyde
Harold L. Jacobs
(Chairman 1954-55)

B. F. GOODRICH CHEMICAL CO.
Thomas R. Linak

HILTON-DAVIS CHEMICAL CO.
Chester H. Allen
(Secretary)

KOPPERS COMPANY, INC.
Richard S. Rhodes

ELI LILLY AND CO.
Daniel Coates
R. G. Weldele

MATHIESON CHEMICAL CORP.
Clement E. Rowe
John F. Synan

WILLIAM S. MERRELL CO.
F. J. Messman

MINNESOTA MINING AND MFG. CO.
F. B. Richerson
A. K. Telfer

MONSANTO CHEMICAL CO.
W. T. Dickens
Jack T. Garrett

NATIONAL-PETRO CHEMICALS CORP.
G. E. Montes

PENNSYLVANIA SALT MFG. CO.
Walker Penfield

CHARLES PFIZER AND CO.
Paul A. Benning
C. E. Smith

PROCTER AND GAMBLE CO.
V. E. Gex
W. R. Gowdy
R. S. Hyatt
R. L. Kramer

STANDARD ULTRAMARINE AND COLOR CO.
Wyatt E. Williams

WYANDOTTE CHEMICAL CORP.
Lyman W. Jillion

ROBERT F. ROCHELEAU
Commission liaison member
J. E. KINNEY
Committee coordinator

BITUMINOUS COAL INDUSTRY ADVISORY COMMITTEE

BITUMINOUS COAL RESEARCH, INC.
H. J. Rose*

BUTLER CONSOLIDATED COAL CO.
W. P. Vance

CARBON FUEL CO.
L. N. Thomas

CENTRAL PENNSYLVANIA
COAL PRODUCERS ASSN.
R. T. Laing
(Vice-chairman)

CONSOLIDATION COAL CO.
A. C. Dittrick*

HANNA COAL CO.
W. E. Bearce*
James Hyslop

INDIANA COAL ASSN.
L. E. Sawyer*

QUAKER STATE OIL REFINING CO.

T. A. Anderson
(Chairman 1954-55)

ROCK ISLAND REFINING CORP.

C. O. Anderson

SINCLAIR REFINING CO.

L. M. Ferguson

SOCONY-VACUUM OIL COMPANY, INC.

R. R. Jackson
D. T. Quinn

SOHIO PETROLEUM CO.

Donald W. Heil

L. SONNEBORN SONS, INC.

Hans Schindler

STANDARD OIL CO. (INDIANA)

W. F. Meehan

STANDARD OIL CO. (OHIO)

E. P. Kropp
Donald G. Stevens

SUN OIL CO.

W. H. Barcus

TEXAS OIL CO.

E. E. Aine
J. W. Fitzpatrick
P. N. Klein
W. H. Roach

CLARENCE W. KLASSEN

Commission liaison member

J. E. KINNEY

Committee coordinator

WATER USERS COMMITTEE

AMERICAN CYANAMID CORP.

Harry Pitts

AMERICAN GAS AND
ELECTRIC SERVICE CO.

Robert G. Call

CINCINNATI, OHIO

WATER PURIFICATION PLANT

Dan Enright
(Chairman 1953-54)

COLUMBIA-SOUTHERN CHEMICAL CORP.

T. W. Heiskell
(Chairman 1954-55)

EVANSVILLE, INDIANA

WATER TREATMENT PLANT

James Clayton

HUNTINGTON, WEST VIRGINIA

WATER TREATMENT PLANT

J. C. Edwards

LOUISVILLE, KENTUCKY

WATER TREATMENT PLANT

W. L. Williams

PORTSMOUTH, OHIO

WATER TREATMENT PLANT

H. C. Growdon

WEIRTON STEEL CORP.

P. D. Simmons

WEIRTON, WEST VIRGINIA

WATER TREATMENT PLANT

F. J. DeFranco

WHEELING STEEL CORP.

Henry Stobbs

WHEELING, WEST VIRGINIA

WATER TREATMENT PLANT

A. R. Todd

ROBERT K. HORTON

Committee coordinator

AQUATIC-LIFE ADVISORY COMMITTEE

DR. LLOYD L. SMITH, JR.

University of Minnesota
(Chairman)

DR. BERTIL G. ANDERSON

Pennsylvania State College

DR. WALTER A. CHIPMAN

U. S. Fish and Wildlife Service

PROF. THEODORE OLSON

University of Minnesota

DR. EDWARD SCHNEBERGER

Wisconsin Conservation Commission

DR. WILLIAM A. SPOOR

University of Cincinnati

DR. CLARENCE M. TARZWELL

U. S. Public Health Service

DR. O. LLOYD MEEHEAN

U. S. Fish and Wildlife Service
(Commission liaison member)

J. E. KINNEY

Committee coordinator

In listing the names of the members of its industry and advisory committees the Commission wishes to re-affirm its appreciation and high regard for the many useful services that have been contributed and continue to be rendered by these men and the companies, cities and universities they represent.

Water Users Committee, representing both municipalities and industries that are monitoring water quality variations in the Ohio River, includes: R. G. Call, P. D. Simmons, T. W. Heiskell, Dan Enright, J. C. Edwards, Harry Pitts, R. K. Horton, H. C. Growdon, F. J. DeFranco and Henry Stobbs.

Hupco photo



SEWAGE-TREATMENT STANDARDS 5, 6 and 7
established by the
OHIO RIVER VALLEY WATER SANITATION COMMISSION

A public hearing was held at Louisville, Ky., on December 9, 1953 in accordance with Article VI of the Ohio River Valley Water Sanitation Compact, the pertinent sections of which read as follows:

"It is recognized by the signatory states that no single standard for the treatment of sewage or industrial wastes is applicable in all parts of the District due to such variable factors as size, flow, location, character, self-purification, and usage of waters within the District. The guiding principle of this Compact shall be that pollution by sewage or industrial wastes originating within a signatory state shall not injuriously affect the various uses of the interstate waters as hereinbefore defined.

"All sewage from municipalities or other political subdivisions, public or private institutions, or corporations, discharged or permitted to flow into these portions of the Ohio River and its tributary waters which form boundaries between, or are contiguous to, two or more signatory states, or which flow from one signatory state into another signatory state, shall be so treated, within a time reasonable for the construction of the necessary works, as to provide for substantially complete removal of settleable solids, and the removal of not less than forty-five per cent of the total suspended solids; provided that, in order to protect the public health or to preserve the waters for other legitimate purposes including those specified in Article I, in specific instances such higher degree of treatment shall be used as may be determined to be necessary by the Commission after investigation, due notice and hearing."

Evidence submitted led the hearing board (consisting of Commissioners Henry Ward, chairman; Joseph L. Quinn, Jr. and W. H. Wisely) to make recommendations that were subsequently adopted by the Commission as Treatment Standards 5, 6, and 7. These standards were established subject to revision as changing conditions may require.

TREATMENT STANDARD No. 5

Adopted January 13, 1954

All sewage from municipalities or other political subdivisions, public or private institutions or corporations discharged or permitted to flow into that portion of the Ohio River extending from mile point 483.2 (miles below Pittsburgh, Pa.), located about ten miles downstream from Cincinnati, Ohio, and at which point is located

Dam No. 37, to mile point 750.0 (miles below Pittsburgh, Pa.), located about six miles upstream from Owensboro, Ky., shall be so treated as to provide for:

- (a) Substantially complete removal of settleable solids; and
- (b) Removal of not less than forty-five per cent of the total suspended solids.

TREATMENT STANDARD No. 6

Adopted January 13, 1954

All sewage from municipalities or other political subdivisions, public or private institutions or corporations discharged or permitted to flow into that portion of the Ohio River extending from mile point 750.0 (miles below Pittsburgh, Pa.), located about six miles upstream from Owensboro, Ky., to mile point 803.0 (miles below Pittsburgh, Pa.), located near Henderson, Ky., shall be so treated as to provide for:

- (a) Substantially complete removal of settleable solids; and
- (b) Removal of not less than forty-five per cent of the total suspended solids; and, in addition
- (c) Reduction in coliform organisms in accordance with the following schedule:

Not less than 85 percent reduction during the months May through October.

Not less than 65 percent reduction during the months November through April.

TREATMENT STANDARD No. 7

Adopted January 13, 1954

All sewage from municipalities or other political subdivisions, public or private institutions or corporations discharged or permitted to flow into that portion of the Ohio River extending from mile point 803.0 (miles below Pittsburgh, Pa.), located near Henderson, Ky., to Cairo Point, Ill., located at the confluence of the Ohio and Mississippi Rivers and being 981.0 miles downstream from Pittsburgh, Pa., shall be so treated as to provide for:

- (a) Substantially complete removal of settleable solids; and
- (b) Removal of not less than forty-five per cent of the total suspended solids.

FIRST ANNUAL REPORT—Nov. 1949

Background leading to establishment of Commission; plans and goals; reproduction of the compact.

PREVENTING STREAM POLLUTION FROM OIL PIPELINE BREAKS

Sept. 1950—A guidebook of recommended practice.

SECOND ANNUAL REPORT—Nov. 1950

An accounting of activities and projects; status of municipal sewage-treatment programs; development and work of industry-action committees.

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. (Out of print)

BACTERIAL-QUALITY OBJECTIVES FOR THE OHIO RIVER

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

PHENOL WASTES TREATMENT BY CHEMICAL OXIDATION

June 1951—Report of a cooperative research project which shows how phenols can be destroyed by three methods of chemical oxidation—using chlorine, ozone and chlorine dioxide. (Out of print)

POLLUTION PATTERNS IN THE OHIO RIVER—1950

June 1951—Water-quality conditions and changes revealed by a simultaneous sampling of the 963-mile stretch from Pittsburgh to Cairo. (Out of print)

PLATING-ROOM CONTROLS FOR POLLUTION ABATEMENT

July 1951—A guidebook of principles and practice for curbing losses of solutions and metals that otherwise might find their way into water courses.

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. (Out of print)

CLEAN STREAMS FOR THE OHIO VALLEY

Sept. 1951—A non-technical public education booklet which outlines the water pollution problem and its solution through treatment plants.

THIRD ANNUAL REPORT—Nov. 1951

Outline of program activities, including details of technical studies, river investigations and educational campaign.

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. (Limited supply)

PLANNING AND MAKING INDUSTRIAL WASTE SURVEYS

April 1952 (44pp., 27 illus.)—Detailed instructions for measuring volume of flow, obtaining representative samples and calculating waste load. (Price \$1.00)

COMMISSION PUBLICATIONS

HOW TO GET SEWAGE TREATMENT WORKS IN OHIO

June 1952 (40pp.)—A guide describing recommended 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 (76pp., 17 illus.)—An analysis of methods for treating spent solutions resulting from sulfuric acid pickling to reduce stream pollution. Compiled by the Steel Industry Action Committee. (Out of print)

FOURTH ANNUAL REPORT—Nov. 1952

Graphic presentation of inter-relationships of varied groups and activities that comprise program. Depicts goals and accomplishments.

METHODS FOR TREATING METAL-FINISHING WASTES

Jan. 1953 (72pp., 16 drawings) An evaluation of various disposal methods and their applicability to specific waste control conditions. Compiled by Metal-Finishing Industry Action Committee. (Price \$2.00)

REDUCING PHENOL WASTES FROM COKE PLANTS

Jan. 1953 (36pp., drawings and tables)—The sources, volumes and concentrations of phenolic wastes and methods for reduction by process changes or treatment. (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. (Limited supply)

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. (Limited supply)

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.

FIFTH ANNUAL REPORT—Nov. 1953

A detailing of action during the first five years. The record shows the transformation that has occurred: new pollution curbed, existing pollution decreased and the trend of half a century reversed.

PROCEDURES FOR ANALYZING METAL-FINISHING WASTES

Aug. 1954 (102pp.)—Methods designed to screen out interfering substances and selected for accuracy and reproducibility of results. (Price \$1.00)

OHIO RIVER VALLEY WATER SANITATION COMMISSION — SIXTH ANNUAL REPORT