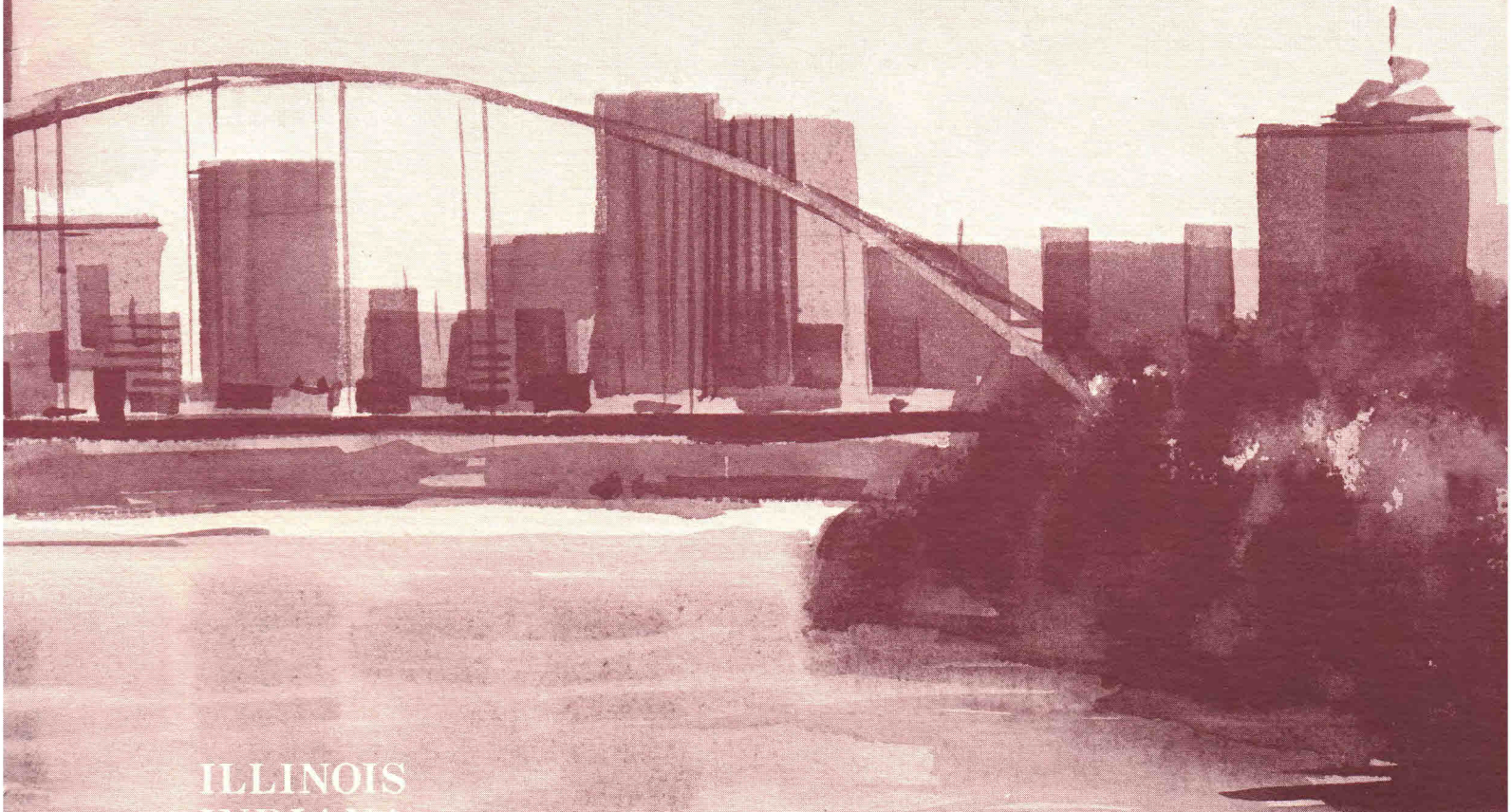
RIVERSCAPE '80

ORSANCO



ILLINOIS
INDIANA
KENTUCKY
NEW YORK
OHIO
PENNSYLVANIA
VIRGINIA
WEST VIRGINIA

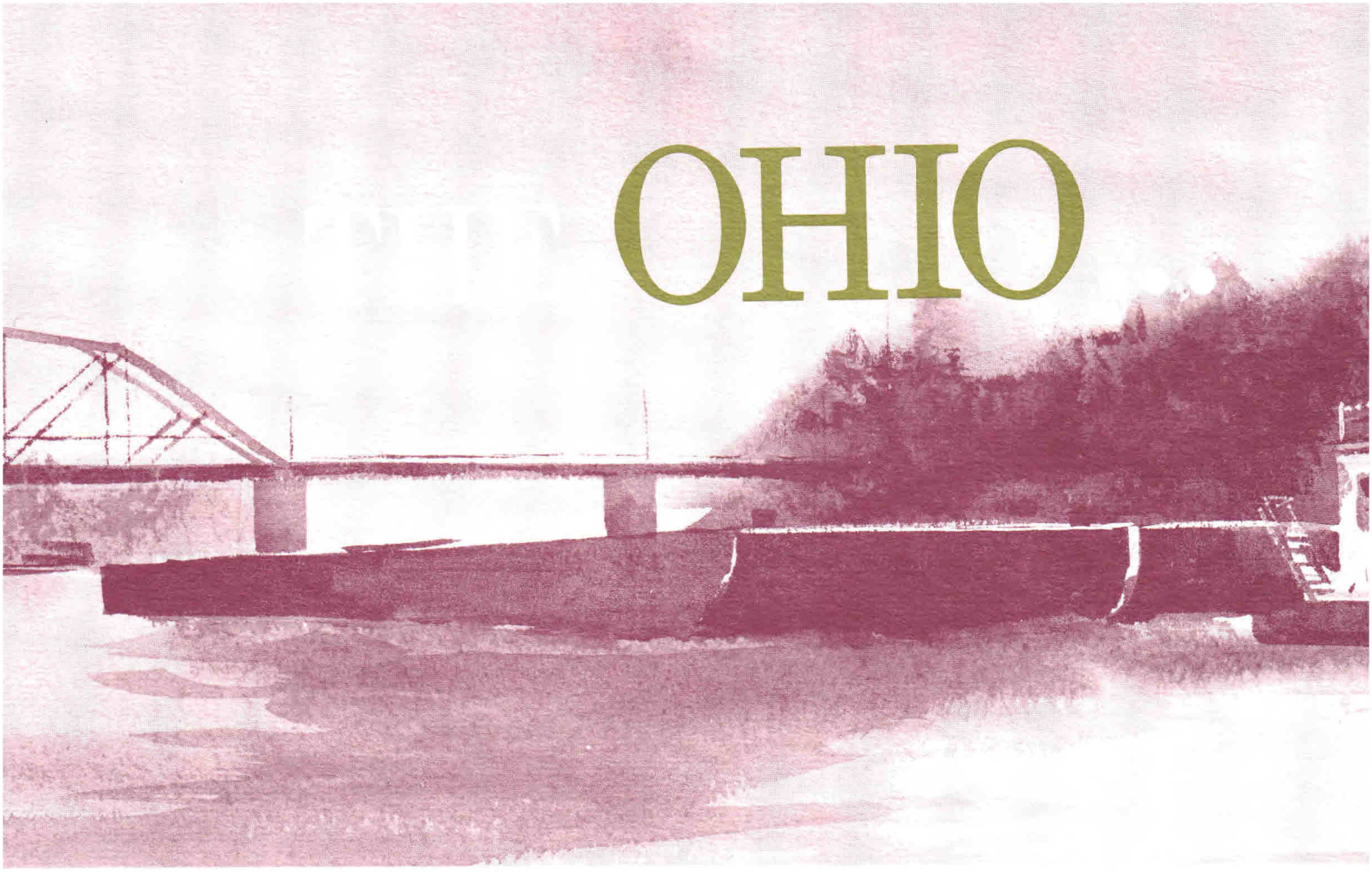
THE OHIO RIVER SANITATION 1980

VALLEY WATER COMMISSION

The commissioners of the Ohio River Valley Water Sanitation Commission — an interstate compact agency created jointly in 1948 by

the State of Illinois,
the State of Indiana,
the Commonwealth of Kentucky,
the State of New York,
the State of Ohio,
the Commonwealth of Pennsylvania,
the Commonwealth of Virginia,
the State of West Virginia

with the approval of the Congress of the United States — respectfully submit a review of the commission's activities in 1980.

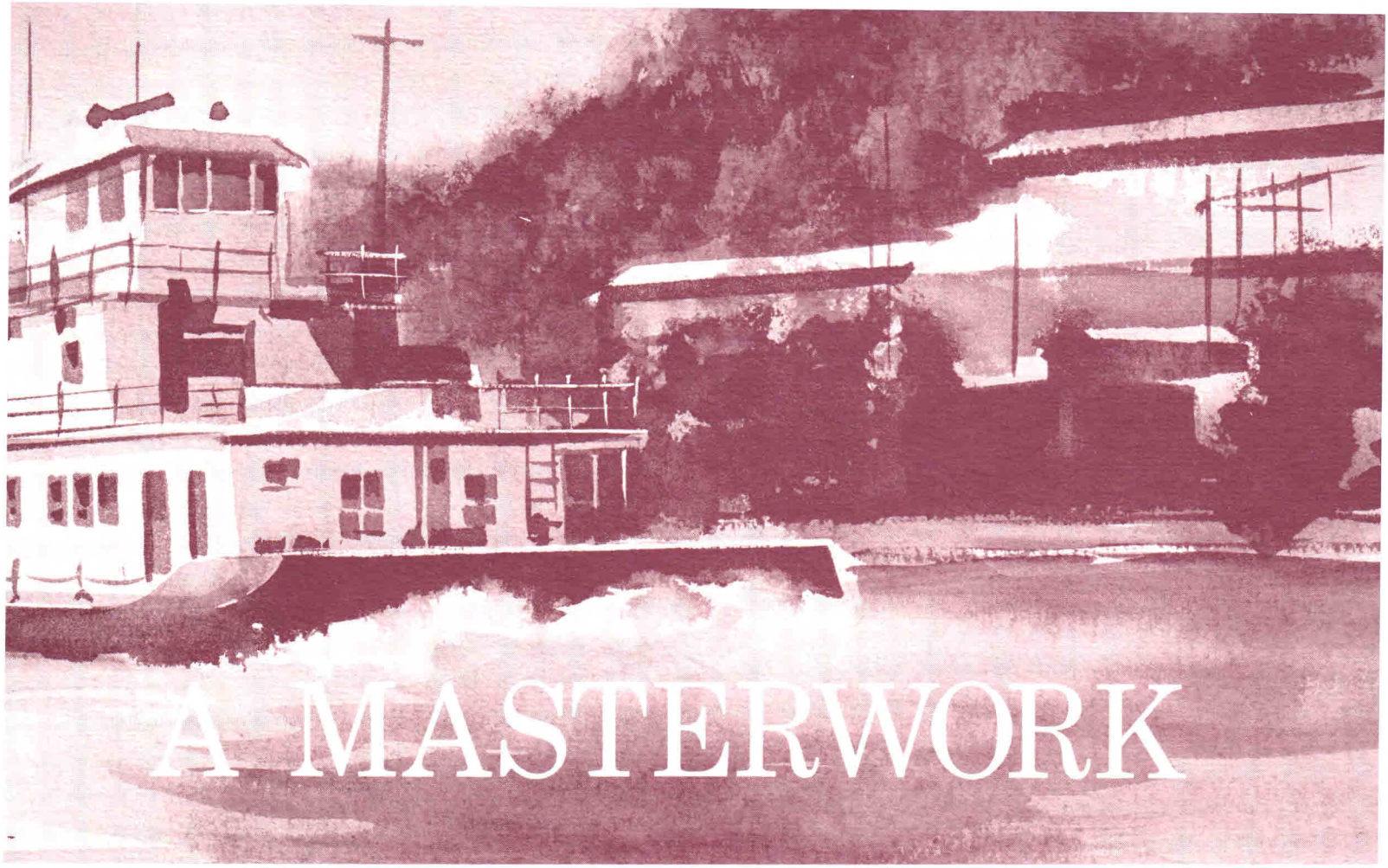


OHIO

It is impossible to capture the immensity and diversity of the Ohio River in one image. Every reach of a thousand-mile river like the Ohio has its own character, its own strengths, its own potential problems. Along the shores of the upper Ohio industry abounds, giving way to rural areas in the lower reaches. The river nourishes all kinds of cities and towns — from thriving, industrial Pittsburgh to quaint river towns like Marietta and Rising Sun, from the population centers of Cincinnati and Louisville to the villages of southern Illinois. The Ohio Basin extends into rural New York and Virginia, across the great breadth of Ohio, through the fertile heartlands of Indiana, Kentucky, and West Virginia.

In 1980, the Ohio River and its tributary streams present a picture of progress as well as one of contrasts. The improved quality of these rivers is the result of more than 30 years of concentrated effort by the Ohio River Valley Water Sanitation Commission and the states it represents to revive waters that were choking with pollution in the 1940's. Only a few traditional water quality problems remain and the resources of the Ohio are being put to use: as drinking water for three million people, as a dependable water source for industrial processing, as a focal point for urban revitalization efforts.

The cleanup of the Ohio has been impressive, a portent that emerging environmental challenges of the 80's will be equally well met. It has been accom-



A MASTERWORK

plished with no turnaround in industrial development, no cutback in vital river traffic, no reverse in basin growth. Second only to the Mississippi in US inland river traffic, the Ohio was used to transport an estimated 222 million tons of cargo in 1980; in ten years it will carry a projected 300 million tons. Since 1950, 56.5 billion dollars has been dedicated to industrial expansion along the Ohio and its navigable tributaries — seven billion dollars in 1977-8 alone.

Even as this picture of the Ohio River Valley as a mecca for American industry develops, another perspective of the river as a recreational resource emerges. The people of the valley are rediscovering the beauty of the Ohio River. During the 1980 recreational season over 50 full-scale regattas were held on the Ohio, an average of one every 20 miles. The Corps of Engineers estimates that more than three million visitors used its recreational facilities along the Ohio last year. Among fishermen in West Virginia the Ohio River is the favorite bass tournament site; in the state of Kentucky it ranks third.

The Ohio is a river of innumerable vistas. It is, for the people of the valley, a vital resource which must be managed wisely. ORSANCO's role in that effort is to guard the water quality of the river, preserving its usefulness to valley citizens and broadening the range of its future possibilities, as one of the great masterworks of nature.

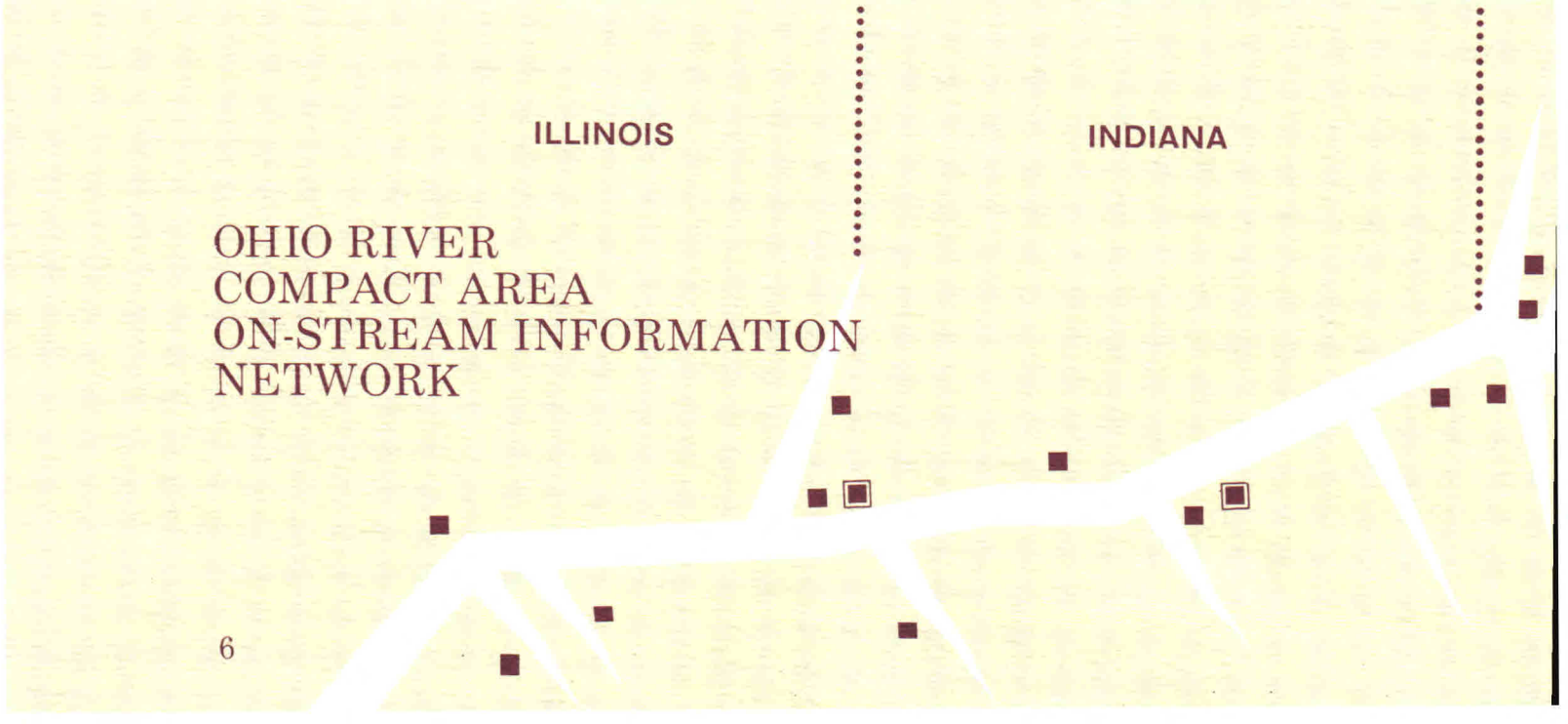
R. S. Engelbrecht

Richard S. Engelbrecht
Chairman

A PERSPECTIVE ON THE RIVER

A water quality analyst is presented with a wide-ranging palette of potential indicators of a stream's health, and a well-planned river surveillance program will monitor those characteristics which give the clearest picture of the stream's quality. ORSANCO's river monitoring system provides such a picture for the Ohio and the lower reaches of the major tributaries. Regular readings are taken of numerous physical characteristics, minerals, nutrients, trace metals, organics, and bacteria. A special spill-detection program identifies fluctuations in levels of selected organic materials. Monitoring of fish populations and analysis of tissue samples provide another dimension of the total quality coloration of the river: fish abundance and distribution reflect the attractiveness of the river as a habitat, and fish tissues signal potential harm from foreign substances entering the food chain.

In 1980 the commission operated 22 automatic monitors in the basin and collected samples for more extensive analysis at 36 sites. Fish were collected at 12 lock chambers on the Ohio, Monongahela, and Allegheny Rivers. Additional fish samples from other sites were contributed by Kentucky, West Virginia, and Pennsylvania. Tissues are being analyzed for trace metals and organics



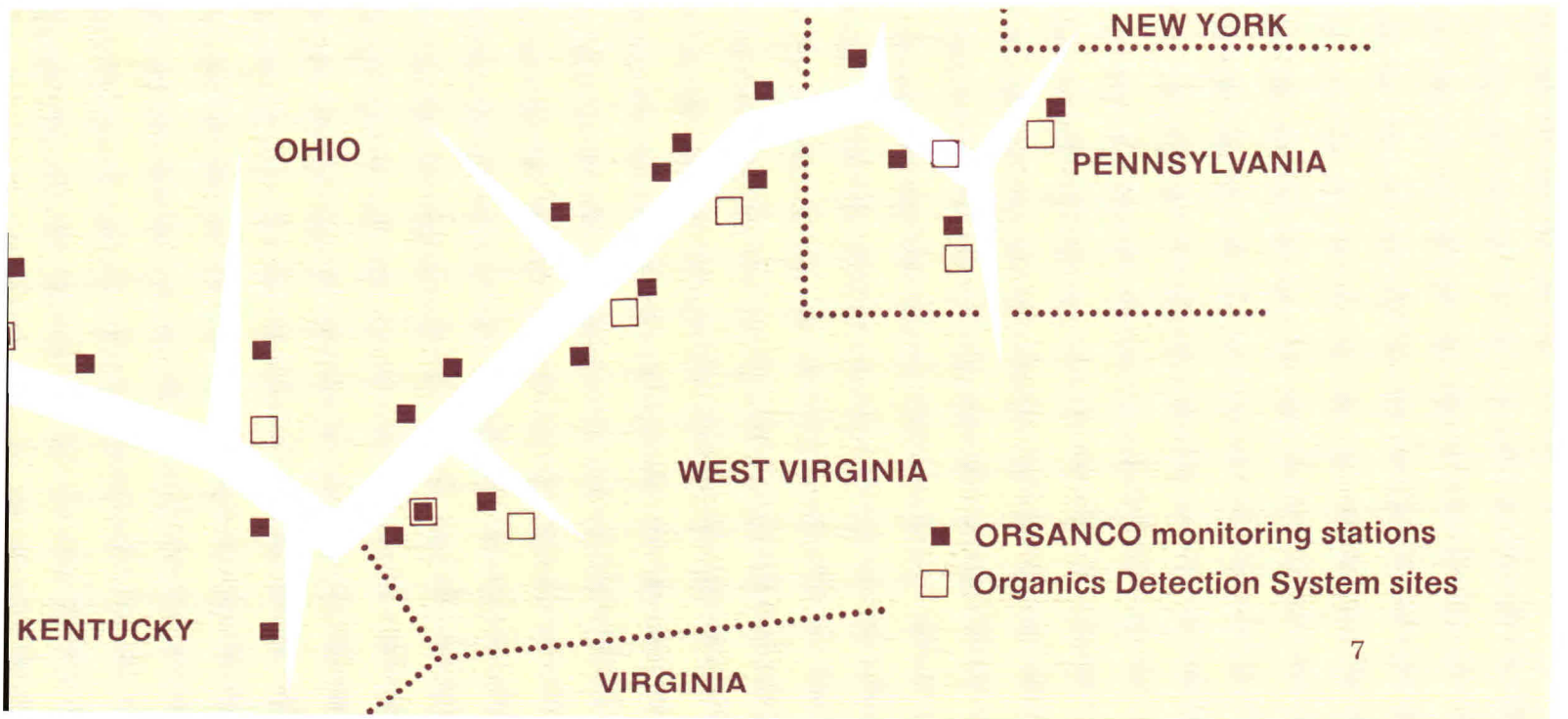
by the US Food and Drug Administration. Because these are cooperative programs conducted under the auspices of the commission, the states are provided more extensive information than they could afford to gather individually. Duplication of effort is avoided and comparable data are collected for the entire river. The result is as comprehensive a data base for the Ohio as for any stream in the nation.

Spill Detection

While regular river surveillance programs test for a spectrum of materials present in streams under standard conditions, detection of unforeseen spills and unauthorized discharges to public streams demands a unique monitoring program. Time is the important factor: discovering a spill days after the fact in the normal sequence of laboratory analysis does nothing to protect the public from transient events. Three years ago, in response to public concern about toxic materials entering water supplies undetected, the commission pioneered in developing an innovative spill-detection system.

Because of support proffered by participating water utilities and industries and the financial and technical assistance of the US Environmental Protection Agency, the system now provides daily monitoring for selected organic materials at 11 strategically located sites in the basin. Analytical results are available the same day the samples are taken; immediate warning may be given to potentially affected cities and towns when unusual levels are found. Five such events occurred during 1979 and the first half of 1980; none proved to be of sufficient significance to require other than routine notification.

After several years of operating the detection system, the commission has now taken steps to increase the number of substances which may be measured. A wider range of detectable chemicals will increase the effectiveness of the system and provide an even more detailed picture of both the quantity and types of organic materials in the Ohio and its major tributaries.



THE QUALITY SPECTRUM

Evaluation of water quality data is a complex task because picturing a stream's quality in any comprehensive way requires consideration of numerous interdependent factors. To evaluate just one of these factors, information must be gathered about its in-stream effects, human and aquatic reactions to it, and the effectiveness of treatment systems in neutralizing it. Each day more chemicals are developed and man's ability to detect them in minute quantities improves, causing an ever-increasing need for more information about more water quality variables.

When information about a given quality characteristic is available, the task of evaluating its impact in water becomes easier, and pollution control specialists can determine acceptable levels in water supplies. Working with representatives from the states and participating federal agencies and using US EPA guidelines as a baseline reference, the commission has recommended water quality criteria which specify such limits for selected substances in the Ohio River. These criteria are used to evaluate the data collected in ORSANCO's river surveillance program.

1979-80

As the year's data are compared to the commission's criteria, an encouraging view of Ohio River water quality emerges. Three-fourths of the 20 characteristics for which criteria have been established were acceptable during the entire period — July, 1979 -June, 1980. Among the 15 satisfactory elements were temperature, pH, and several heavy metals.

These positive findings provide an enlightening perspective on Ohio River water quality. For instance, satisfactory temperatures were maintained throughout the year, an essential step in assuring water quality. Temperature affects many of the beneficial uses of a stream: changes in temperature may damage fish habitats and influence the stream's assimilative capacity.

The Ohio's acceptable pH values are also of importance. Because pH is an indicator of alkalinity or acidity, it signals a basic aspect of the stream's

environment. The toxicities of some chemicals, such as cyanide and ammonia, vary with changes in pH. Deviations from the normal pH range indicate conditions which can adversely affect aquatic life and interfere with drinking water treatment.

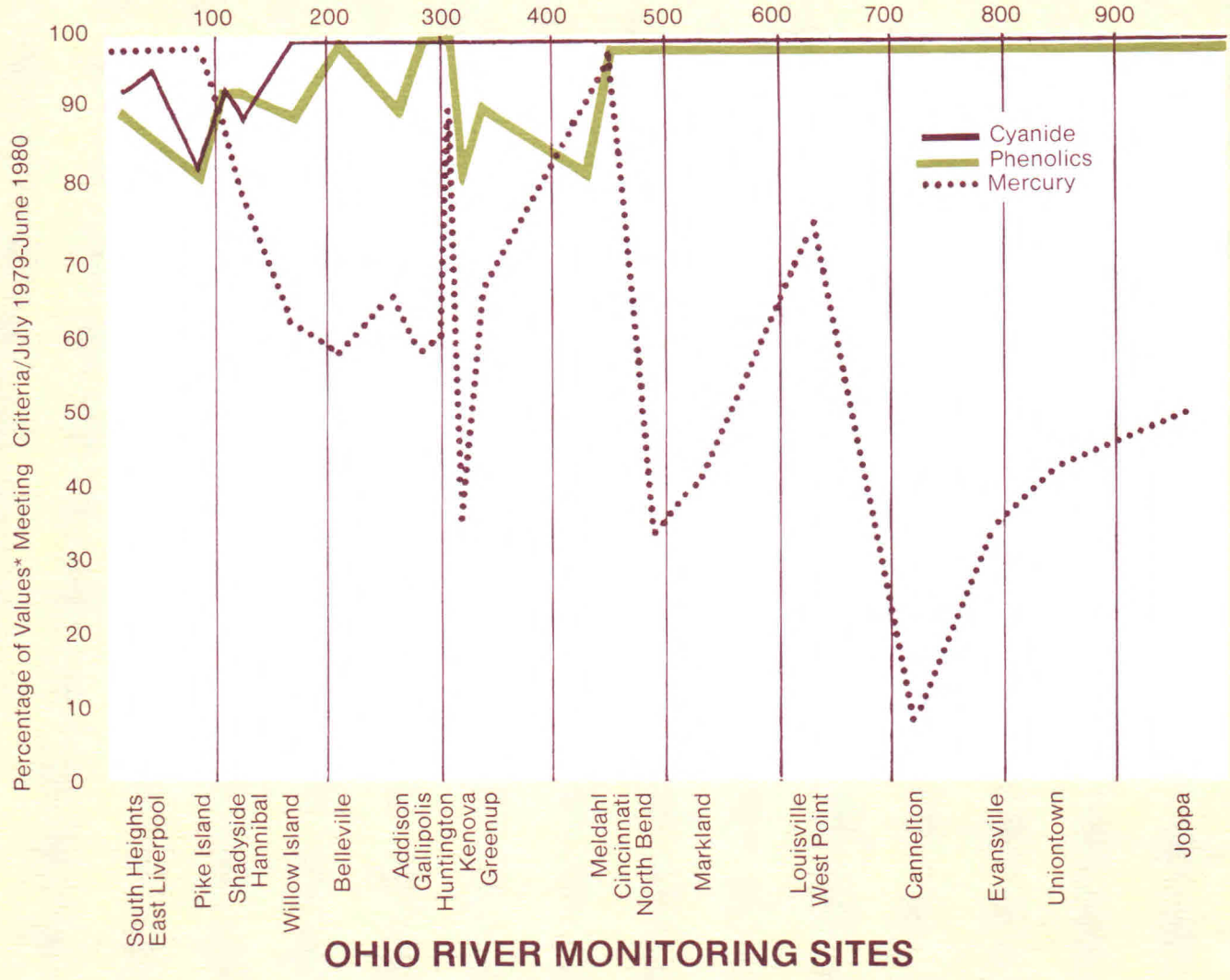
The toxic metals barium, cadmium, and lead were not problems on the Ohio during the year. Nitrogen compounds, including ammonia, nitrites, and nitrates, were also within acceptable limits.

Opportunities for Improvement

Five of the regularly measured quality characteristics posed problems of varying degrees, though several are showing marked improvement. Portions of the Ohio failed to meet criteria for dissolved oxygen, cyanide, phenolics, mercury, and fecal coliform at times during the 1979-80 program year.

Dissolved oxygen problems were rare: daily values were above minimum levels more than 98 percent of the year. Oxygen is among fundamental water quality indicators. Sufficient oxygen is needed in streams to support aquatic life; oxygen supplies are depleted in the natural breakdown of pollutants in the water. The occasional low oxygen values occurred primarily on the middle and lower Ohio, below Cincinnati and Louisville.

The chart on page 10 shows the frequency at which criteria for cyanide, phenolics, and mercury were met at all Ohio River monitoring sites. A decreasing occurrence of high cyanide values has been noted on the upper river the past several years, as indicated in the graph on page 11; however, cyanide concentrations still constituted a problem in 1979-80. A cyanide limitation of 25 micrograms per liter has been established to protect aquatic life, which is much more sensitive to cyanide ingestion than humans, who are able to biotrans-



*Actual number of samples varies by constituent and sampling site.

form up to thousands of times that amount. Industries discharging cyanide in the upper Ohio and lower Monongahela Rivers are required to reduce cyanide discharges by December, 1982; one industry has already reduced its cyanide discharge by over 3,500 pounds per day. State officials expect required discharge reductions to eliminate high cyanide values on the upper Ohio.

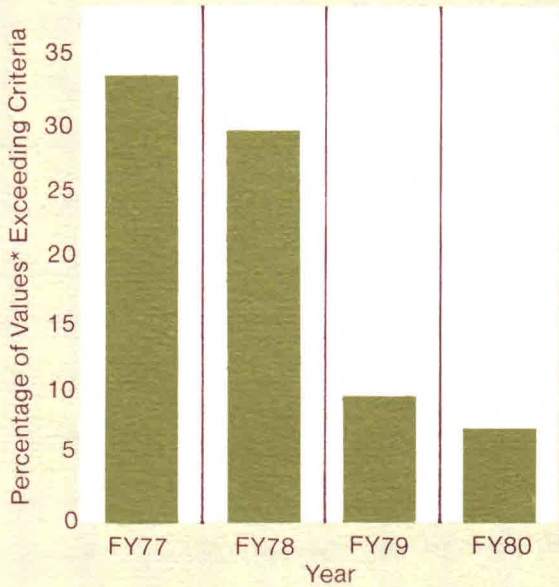
The same discharge requirements should reduce high phenolics concentrations which affected the entire upper half of the Ohio during 1979 and 1980. Phenolic compounds cause problems of taste and odor in water supplies. They may also taint fish flesh and lower in-stream oxygen levels. Though the recommended criterion has been violated occasionally, these undesirable effects have not been noted recently on the Ohio River. An analysis of the results since 1977 indicates gradually fewer unacceptable values.

Ohio River mercury concentrations are of greater concern for a number of

reasons. Values in excess of the criterion were found the entire length of the river. The source of the mercury is unknown; there are no significant industrial discharges of mercury to the river. Because forms of mercury are toxic to humans, criteria are chosen to prevent harmful quantities of mercury from entering the food chain through consumption of fish. When present in particulate form, mercury in untreated river water is readily removable by established methods for drinking water treatment. The high values on the Ohio may present a greater threat through bioaccumulation in fish; however, no excessive values of mercury were found in fish tissues examined in 1978 and 1979. In an attempt to locate the source of the mercury, the states have already conducted in-depth stream surveys. US EPA has attempted to identify air-emission sources of mercury. Studies thus far have been inconclusive, but water pollution control authorities will continue to monitor the mercury problem.

Fecal coliform bacteria are indicators of contamination of water by domestic sewage. High bacterial counts suggest that disease-causing organisms may be present. The commission has established a criterion for fecal coliform bacteria in water to be treated for drinking and a more stringent criterion for water used in water-contact recreation. Of seven sites where frequency of sampling allows comparison to the criteria, all but one met the drinking water criterion for the entire year, and fecal coliform levels were acceptable at that station three-fourths of the year. On the other hand, the criterion for recreational use of the river was met in only 15 percent of the monthly values. The

CYANIDE VALUES EXCEEDING CRITERIA/UPPER OHIO RIVER



*From the Monongahela River (mp 4.5) and the Ohio River (mp 15.2, 40.2, 84.2)
Exact number of samples varies slightly from year to year.

relative impacts of nonpoint sources and direct discharges in contributing to high fecal coliform values have not been determined. Improvements in a number of sewage treatment facilities are anticipated.

Additional factors

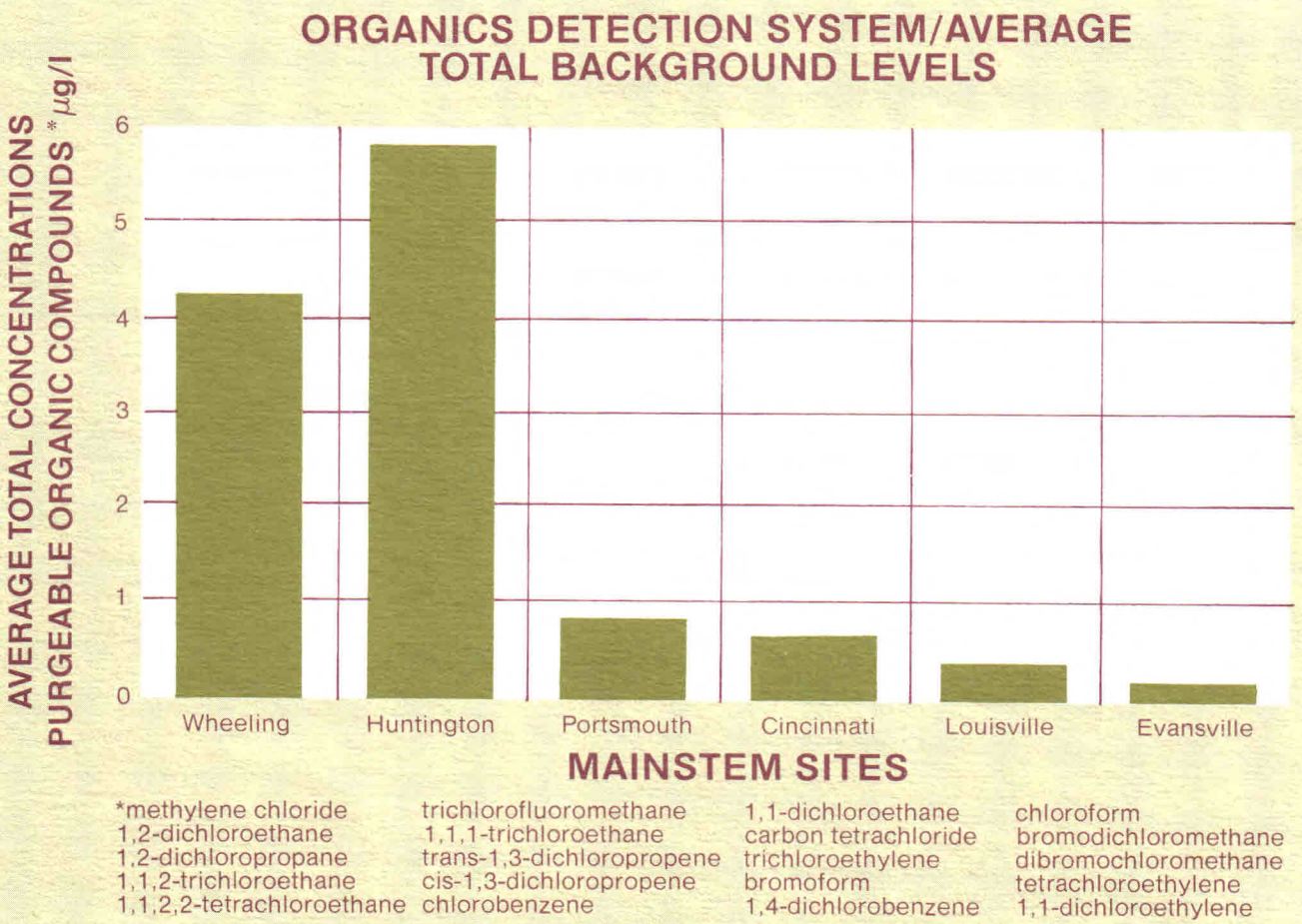
The commission monitors other water quality characteristics for which no criteria have been established. Among them are general factors such as suspended solids, hardness, and alkalinity. These are further gauges of the stream's general condition and may impact other water quality characteristics; findings have given no cause for concern. The commission also monitors iron and manganese, though no criteria have been adopted. These materials are vital nutrients for plants and animals; the particulate form is removed effectively in water treatment, and scientific opinion varies as to what levels may be desirable in streams.

ORGANICS

The spectrum of water quality indicators has become more varied, the potential quality shadings more complex, as analytical capabilities have improved. The tracing of organic substances in water has specifically been affected by this increased capability. Such substances normally contain carbon and are formed in the natural decay of living organisms. The chemical age has brought thousands of synthetic varieties which have unknown in-stream and health effects. These materials may be found in streams in minute quantities, barely measurable.

The commission's spill detection system is specifically designed to identify and quantify selected organic materials in the source streams. Data from that program and results from the fish-tissue analyses constitute the information about organic materials collected by ORSANCO. More extensive and vital confirmatory analyses have been suspended because of lack of funds; resumption of the program depends on funding requested for 1981.

Because of the method of analysis,



data from the spill detection network are presumptive results only. When unusually high levels of a given material are noted, a sample must be sent to a laboratory for further testing and confirmation. The data from the system must therefore be viewed as tentative; however, certain trends are discernible.

The graph on page 12 shows an average of total concentrations for all organics measured at Ohio River stations during an 18-month period ending in June, 1980. As might be expected, the more populated, industrialized upper river shows slightly higher levels, though all averages are below six parts per billion (ppb). What these concentrations of organics mean is difficult to assess. Stream quality criteria for these compounds have not yet been adopted by either US EPA or the states; however, the levels of organics found in the Ohio River appear to be extremely low. A drinking water limit for one group of the compounds has been established at 100 ppb after treatment; the entire selection measured by ORSANCO has been far below that level in the stream, prior to any treatment. In fact, 80 percent of the detected values have been one ppb or less.

Fish-tissue analyses provide another perspective. Tissues may accumulate materials present in the water at such low levels they are undetectable. Samples taken in late 1979 and analyzed for a range of organics and for mercury indicated two potential problem areas. Of 28 fish fillets from the Ohio River, 11 contained excessive quantities of a pesticide chlordane, and three had polychlorinated biphenyls (PCB's) in amounts over the recommended limit. Whole fish results were similar. Because neither of these materials is known to be discharged to the river, the major potential source for future accumulations is believed to be runoff, and control mechanisms for this kind of pollution are in the fledgling stage in both development and implementation.

FISH POPULATIONS

A true riverscape of the Ohio is peopled with fishermen because the "catch" in the river has been improving steadily since 1968. Not only is the Ohio a popular site for bass tournaments, but possibilities for a good commercial crop are also increasing, particularly in the lower two-thirds of the river. In 1968, for example, less than a quarter of the fish collected on the river near Louisville were among types considered commercially valuable; in 1979 at the same site, over half were in that category. The percentage of rough fish, such as catfish and carp, which are considered to be tolerant of pollution,is decreasing in a number of areas. Another group of miscellaneous fish — white catfish, paddlefish, mooneyes, and white bass — is increasingly prolific at three-quarters of the sampling sites. Because this group is more diverse in less polluted water, its widespread proliferation indicates improving water quality.

WASTEWATER TREATMENT

In a highly industrialized and populated region such as the Ohio River Basin, stream quality is largely dependent on the effectiveness of wastewater treatment facilities operating there. A yearly survey of industrial and municipal facilities in the ORSANCO compact area yields data essential to quantify treatment status.

The 1980 survey identified 1,595 privately owned municipal facilities, each processing at least 40,000 gallons of wastewater per day; they serve over 13 million people. Of the facilities tallied, 86 percent are providing at least reliable secondary treatment, which includes primary settling and some form of systematic biological treatment. Almost half of

1980 SURVEY* / OHIO RIVER BASIN

FACILITY NEEDS	IL	IN	KY	NY	OH
MUNICIPAL					
NO NEEDS	*34*	*114*	*182*	*7*	*129*
	133,479	459,048	855,939	48,539	1,032,548
INCREASED TREATMENT	*31*	*127*	*60*	*8*	*44*
	151,652	716,930	537,864	16,549	1,112,698
INCREASED CAPACITY	*3*	*23*	*21*	*0*	*35*
	7,709	214,697	107,636	0	234,458
INCREASED TREATMENT AND CAPACITY	*15*	*24*	*27*	*1*	*159*
	55,222	915,504	148,301	38,999	1,501,039
REPLACEMENT	*7*	*0*	*56*	*0*	*51*
	23,999	0	238,022	0	216,060
TOTAL	*90*	*288*	*346*	*16*	*418*
	372,061	2,306,179	1,887,762	104,089	4,096,803
INDUSTRIAL					
NO NEEDS	*8*	*114*	*62*	*16*	*126*
INCREASED TREATMENT	*1*	*19*	*5*	*5*	*37*
INCREASED CAPACITY	*1*	*1*	*2*	*0*	*5*
INCREASED TREATMENT AND CAPACITY	*0*	*1*	*2*	*0*	*6*
REPLACEMENT	*0*	*3*	*1*	*0*	*3*
TOTAL	*10*	*138*	*72*	*21*	*177*

*Does not include: (1) Facilities treating domestic sewage and privately owned facilities of 40,000 gal/day or less
(2) Industrial facilities of 40,000 gal/day or less
(3) Industrial facilities requiring temperature adjustment only
(4) Coal-related industrial facilities

the facilities currently operating need no alteration or expansion. Of the remaining plants, some require increased treatment, others increased capacity, and some need both expansion and increased treatment. Among the facilities classified as needing some improvement are many which have been required to furnish advanced or tertiary treatment; funding for such treatment has been difficult to obtain and the requirement itself is controversial.

A federal grant program established in 1972 provides financial assistance to communities building wastewater treatment facilities. In the ORSANCO area, 2.4 billion federal dollars has been dedicated to such projects since 1974; state and local money invested amounts to 25 percent of the project costs, more than three-quarters of a billion dollars.

Projects in the federal grant process must progress through three stages: planning, design, and construction. Many of the facility projects in the district are in the early planning stage referred to as Step I — 576 of the 922 projects, or 62 percent. Only 15 percent of the projects, or 135 plants, are under construction; 12 are located along the Ohio River.

Industries in the basin are closer than municipalities to reaching impending requirements. Of the 776 industrial facilities identified in the survey, 19 percent have identified needs, primarily in the area of additional treatment. More than half of those needed improvements are currently under construction.

WASTEWATER TREATMENT FACILITIES

PA	VA	WV	TOTAL	% TOTAL	OHIO RIVER MAINSTEM TOTAL	OHIO RIVER MAINSTEM % TOTAL
159	*15*	*81*	*721*	*45.2*	*63*	*46.3*
2,747,866	52,855	481,570	5,811,844	43.5	2,017,284	61.4
15	*3*	*5*	*293*	*18.4*	*11*	*8.1*
198,525	8,970	32,749	2,775,937	20.8	572,710	17.4
16	*1*	*10*	*109*	*6.8*	*11*	*8.1*
107,984	725	38,719	711,928	5.3	76,197	2.3
15	*24*	*64*	*329*	*20.6*	*41*	*30.1*
166,993	72,008	580,128	3,478,194	26.0	590,877	18.0
17	*7*	*5*	*143*	*9.0*	*10*	*7.4*
32,652	35,349	38,999	585,081	4.4	28,428	0.9
222	*50*	*165*	*1,595*		*136*	
3,254,020	169,907	1,172,165	13,362,984		3,285,496	
154	*30*	*116*	*626*	*80.7*	*118*	*84.9*
22	*0*	*14*	*103*	*13.2*	*12*	*8.6*
2	*2*	*0*	*13*	*1.7*	*2*	*1.4*
7	*0*	*2*	*18*	*2.3*	*4*	*2.9*
					3	*2.2*
7	*1*	*1*	*16*	*2.1*	*139*	
192	*33*	*133*	*776*			

Key: *Facilities*

Population served

CHANGING

The diversity of the Ohio River Basin denies a static description, as well as a simple one. Environmental programs for the Ohio must be dynamic, responding to emerging challenges. As traditional water quality problems are brought under control, others appear which may demand attention.

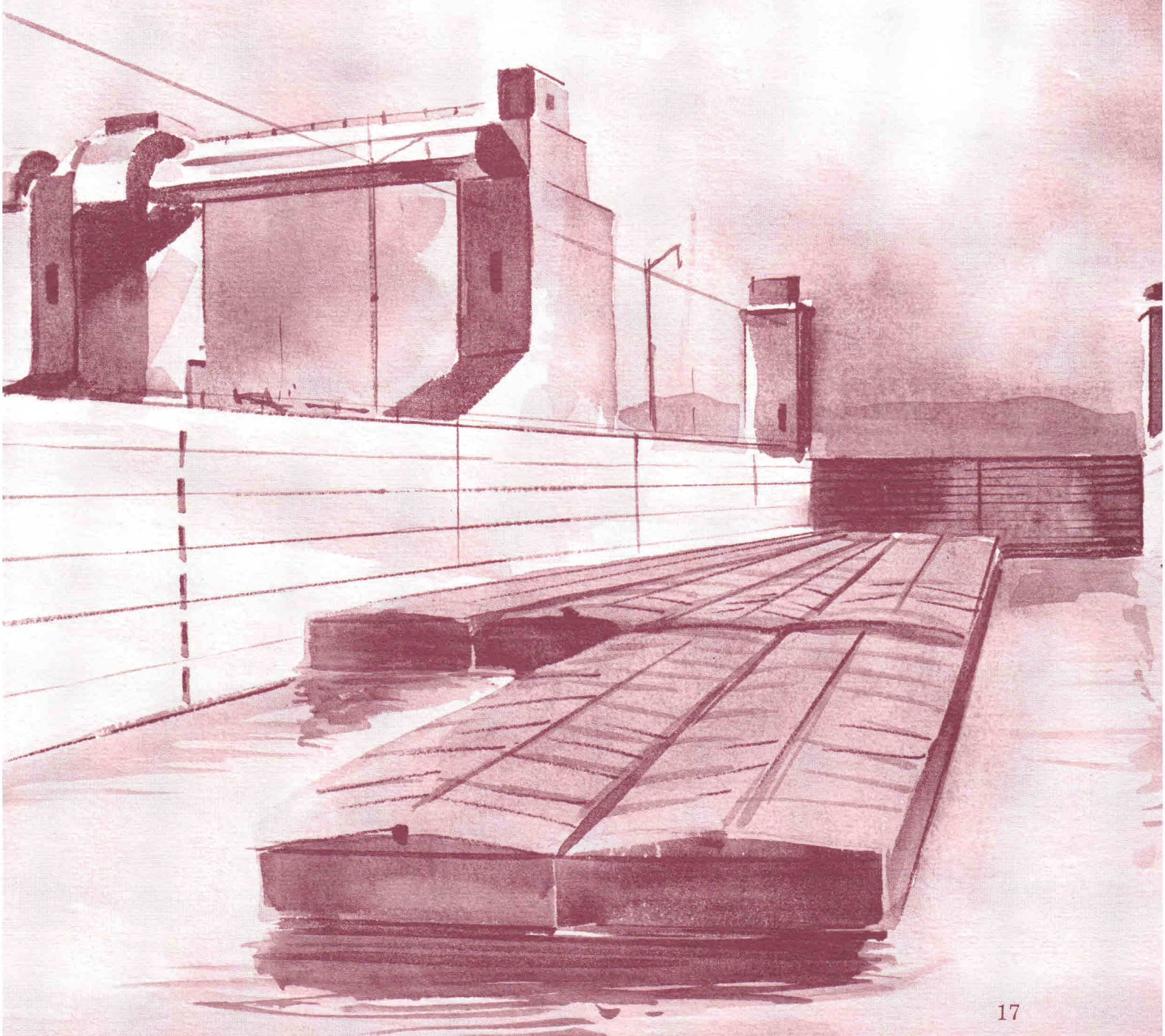
The drive for national self-sufficiency in energy production dramatically impacts the Ohio River Basin, where 15 percent of the nation's energy is produced. A recent survey by ORSANCO's Power Industry Advisory Committee indicates that facilities in operation or under construction along the Ohio alone total a generating capacity of over 45,000 megawatts. Substantial synfuel development is planned for the basin. A number of coal-fired power plants — often blamed for acid rain problems — are located in the valley. Interstate disputes arising from facility siting and subsequent shared environmental impacts may be avoidable in the valley, if a mechanism for interstate cooperation to resolve such matters is devised. The commission is sponsoring a study of possible institutional mechanisms to ensure such cooperation. Funds for the study, which will be conducted in large part by the Council of State Governments, have been provided by The John A. Hartford Foundation.

Another major project for the next year is the revision of the commission's standards for discharges to the Ohio River. The standards, which were adopted in 1970, are enforceable by authorization of the ORSANCO Compact. Revision will involve the commission's entire advisory structure — including industry committees, water utilities, and the public — in addition to state and federal agencies at many levels.

In the 80's, shifting needs in the Ohio Valley may call for responsive shifts in programs for the states which share the river. A major priority for the commission in the coming decade will be to identify these emerging needs and develop programs to maintain the Ohio as the rich, multifaceted resource it should be.

With a deep sense of loss the commission records the death on March 4, 1980, of Commissioner Daniel Malkovich of Illinois. Appointed in 1976, Commissioner Malkovich actively affirmed the goals of the ORSANCO Compact through many contributions to the commission's programs. He will be sorely missed.

SCENES



FINANCIAL REPORT

The following information relative to revenues, expenses, and statement of resources was extracted from the Annual Auditors Report of Wm. H. Mers & Co., Certified Public Accountants, for the year ended June 30, 1980.

OHIO RIVER VALLEY WATER SANITATION COMMISSION
STATEMENT OF REVENUES AND EXPENSES FOR YEAR ENDED JUNE 30, 1980

Revenues:		
From signatory states:		
State of Illinois	$ 18,900.00	
State of Indiana	69,788.00	
Commonwealth of Kentucky	78,000.00	
State of New York	3,975.00	
State of Ohio	96,112.00	
Commonwealth of Pennsylvania	54,825.00	
Commonwealth of Virginia	12,825.00	
State of West Virginia	40,575.00	
Total from signatory states		$ 375,000.00
From US Environmental Protection Agency:		
Water Pollution Control Act Grant	$333,213.00	
Safe Drinking Water Act		
Early Warning — Organics Detection System Grant	237,705.00	
Organic Substances in the Ohio River Research Grant	1,916.00	
Total from US Environmental Protection Agency		572,834.00
From US Corps of Engineers:		
Electronic Monitoring Support	$ 58,700.04	
Allegheny and Pittsburgh District Support	45,850.00	
River Stage Measuring System	14,095.07	
Total from US Corps of Engineers		118,645.11
Other revenues		11,310.27
Total revenues		$1,077,789.38
Expenses:		
Basic Program	$798,167.47	
Early Warning — Organics Detection System	277,196.22	
River Stage Measuring System	14,095.07	
Organic Substances Project	3,523.69	
Synfuel Study — ORBC	934.47	
Total expenses		1,093,916.92
Excess of expenses over revenues		$ 16,127.54

STATEMENT OF RESOURCES AT JUNE 30, 1980

Cash		$ 32,512.66
Deposits		760.80
Accounts receivable:		
US Environmental Protection Agency	$ 32,527.00	
US Corps of Engineers	15,394.11	
Employee advances	660.00	
Total accounts receivable		48,581.11
Total		81,854.57
Less:		
Accounts payable	$ 40,867.46	
Advance payment — signatory states	3,975.00	
Total		44,842.46
Available resources June 30, 1980		$ 37,012.11
Available resources at beginning of year	$ 53,139.65	
Excess of expenses over revenues	16,127.54	
Available resources at end of year		$ 37,012.11

MEMBERS OF THE COMMISSION*

ILLINOIS	**R.S. Engelbrecht, PhD,** *Professor of Environmental Engineering, University of Illinois* **Michael P. Mauzy,** *Director, Illinois Environmental Protection Agency* **(Vacancy)**
INDIANA	**Ronald G. Blankenbaker, MD** *State Health Commissioner* **Robert A. Holt,** *Chairman, Stream Pollution Control Board* **Ralph C. Pickard,** *Assistant Commissioner for Environmental Health*
KENTUCKY	**Frank C. Campbell,** *Vice President and Chief Engineer, Louisville Water Company* **Frank L. Stanonis, PhD,** *Professor of Geology and Geography, Indiana State University* **Jackie Swigart,** *Secretary, Department for Natural Resources and Environmental Protection*
NEW YORK	**Robert L. Barber,** *Assistant Professor of Government and Economics, Jamestown Community College* **Robert E. Flacke,** *Commissioner, Department of Environmental Conservation* **(Vacancy)**
OHIO	**Lloyd N. Clausing,** *Senior Engineer, Goodyear Atomic Corporation* **James F. McAvoy,** *Director, Ohio Environmental Protection Agency* **Augusta A. Prince**
PENNSYLVANIA	**Paul Emler Jr.,** *Senior Environmental Advisor, Allegheny Power Service Corporation* **Clifford L. Jones,** *Secretary, Department of Environmental Resources* **Gail Rockwood,** *Citizens Advisory Council, Department of Environmental Resources*
VIRGINIA	**Warren L. Braun,** *State Water Control Board* **Millard B. Rice,** *State Water Control Board* **William L. Tate,** *State Water Control Board*
WEST VIRGINIA	**Edgar N. Henry,** *Director, Water Development Authority* **George E. Pickett, MD,** *State Director of Health* **(Vacancy)**
UNITED STATES GOVERNMENT	**Richard C. Armstrong,** *Chief, Engineering Division, US Army Engineers, Ohio River* **Norman H. Beamer,** *Water Resources Division, US Geological Survey (retired)* **Rebecca W. Hanmer,** *Region IV Administrator, US Environmental Protection Agency.*

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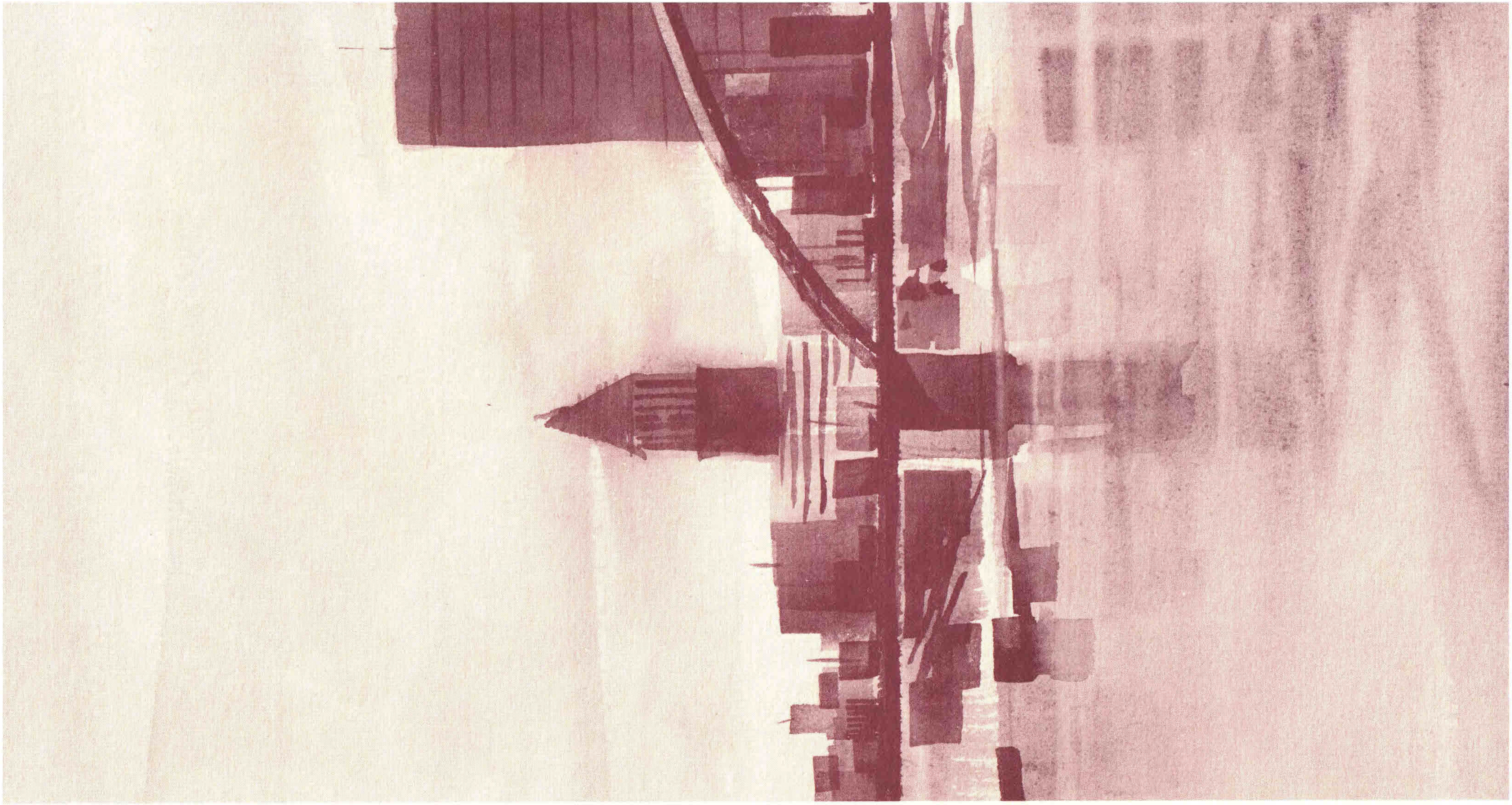
LEGAL COUNSEL	**Leonard A. Weakley,** *Taft, Stettinius and Hollister*

*As of December 1, 1980

Ray Loos—Art



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OHIO RIVER VALLEY WATER SANITATION COMMISSION

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