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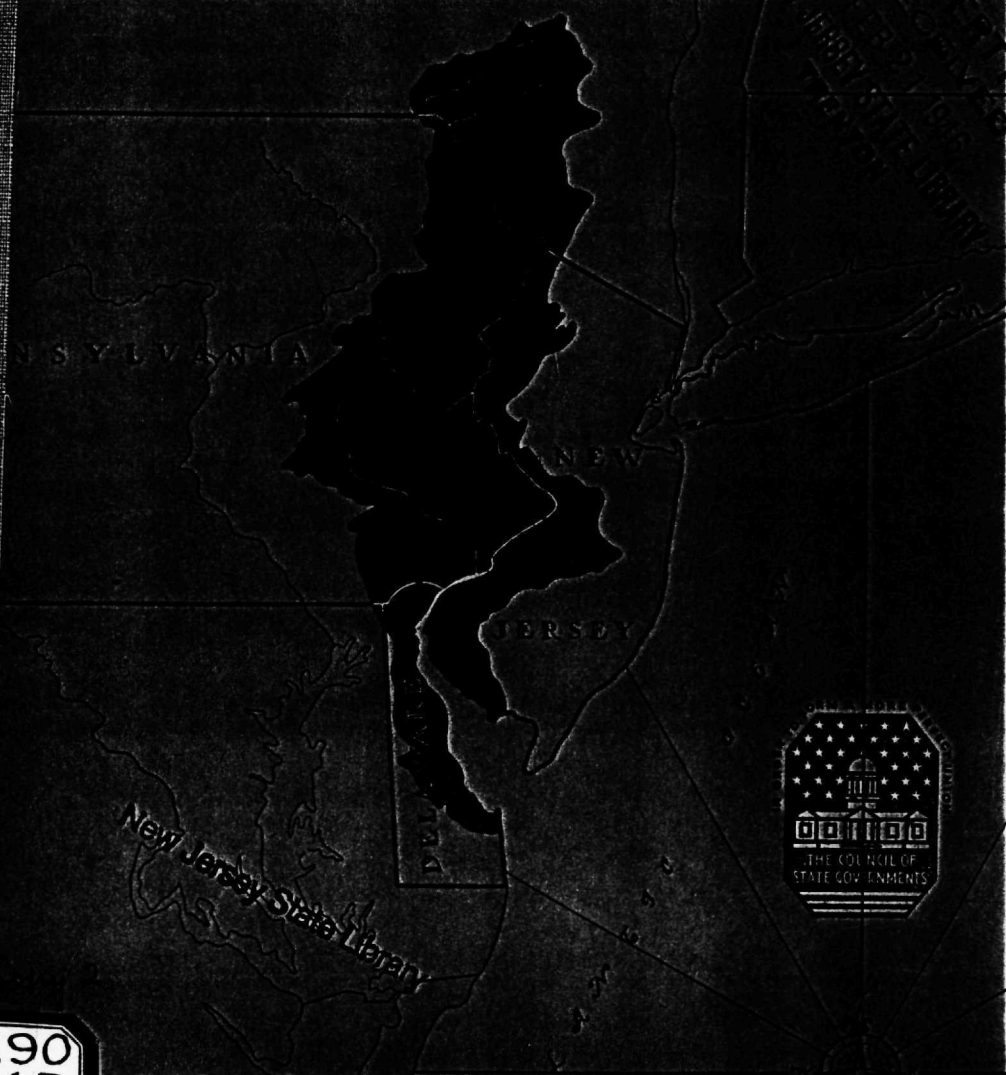
Interstate Commission on the
Delaware River Basin.

The Delaware River Basin
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THE DELAWARE RIVER BASIN PLANNED PROGRESS IN POLLUTION CONTROL NEW YORK



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FOREWORD

This report of progress to the parent agencies of Incodel, the Joint Legislative Commissions on Interstate Cooperation, and to the general public, covers three years of planned progress toward the restoration and maintenance of the quality of water of the Delaware River and its tributaries. From 1936 through 1939, Incodel has devoted a major portion of its time and resources to the critical problem of water pollution control in this drainage basin; important progress has been made in the prevention and abatement of domestic pollution, to which this report exclusively refers. As a public agency, the Commission has held and maintained the view that adequate municipal sewage collection and treatment facilities must be secured before the industrial waste problem can be vigorously attacked.

The progress referred to herein is reported irrespective of who originated any particular project since credit belongs to many. The actual accomplishment has, of course, been made by the official agencies under whose jurisdiction the various projects fall. The important thing is that in the Delaware River Basin, as in other drainage areas, an appreciable amount of construction work in this field has been completed during the past three years; the significant thing is that in the Delaware River Basin, unlike other drainage areas, there now exists a comprehensive interstate plan of pollution abatement and control which is being executed, voluntarily and cooperatively, by the four State Departments of Health.

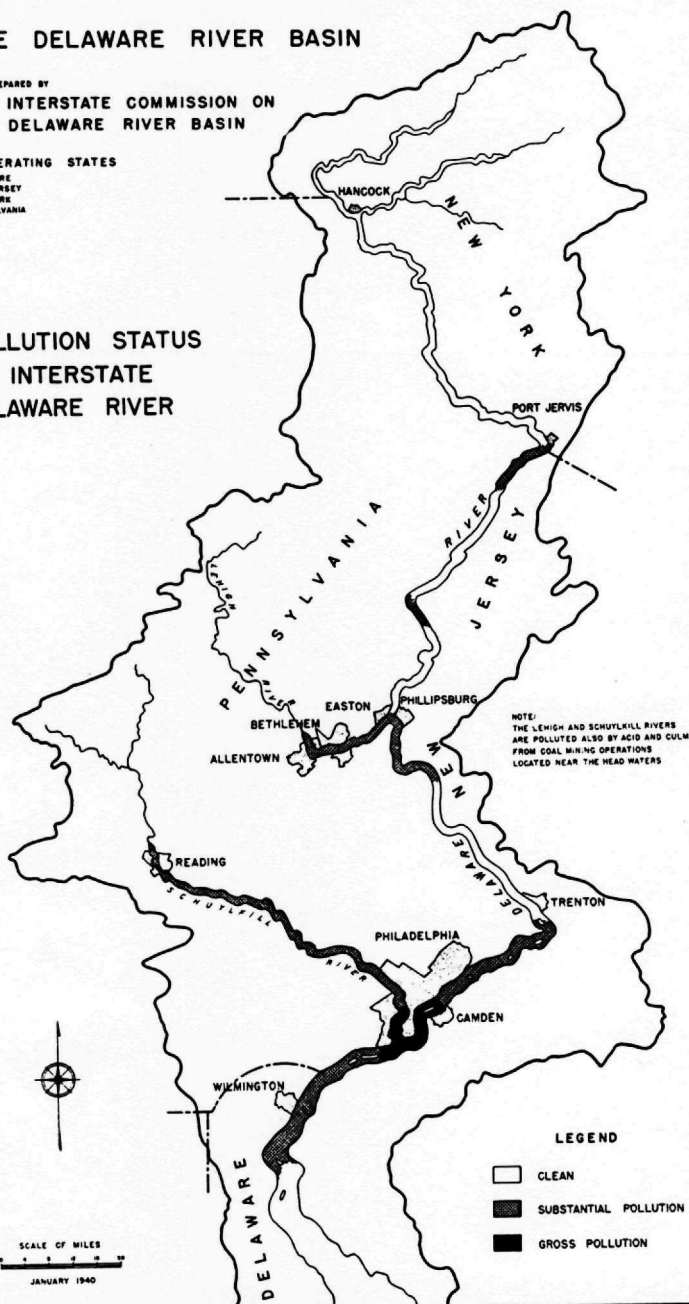
THE DELAWARE RIVER BASIN

MAP PREPARED BY
THE INTERSTATE COMMISSION ON
THE DELAWARE RIVER BASIN

COOPERATING STATES

DELAWARE
NEW JERSEY
NEW YORK
PENNSYLVANIA

POLLUTION STATUS OF INTERSTATE DELAWARE RIVER



I

INTRODUCTION

The Interstate Commission on the Delaware River Basin has concerned itself, since 1936, with the problems involved in the use and development of the water resources of this interstate stream. Dependent for continued existence upon public acceptance, as represented by appropriations from the four state governments, the Commission has purposely limited its activities to a solution of those specific and intricate problems of land and water use and control which are of regional importance, which are most urgently needed, and which will be immediately useful. Among these activities, first consideration has been given to the critical problem of water pollution control in this drainage basin.

This report of planned progress in pollution control involves an appraisal of events of the past three years which have pointed toward the maintenance and restoration of the quality of water of the Delaware River and its tributaries. Two major trends are emphasized: (1) Progress in Planning; and (2) Progress in Construction. A closing section looks forward into the future.

By its organization, the Interstate Commission on the Delaware River Basin is convinced that the administration of pollution abatement is a function best performed by existing state agencies supplemented by such machinery as is necessary to work together cooperatively where major interstate problems are prevalent. The Commission is equally sure that effective abatement of pollution in the Delaware River Basin can be brought about if the carefully integrated plan outlined in the first section of this report is faithfully followed by the participating states.

Ellwood J. Turner
Chairman

For the Commission

THE DELAWARE RIVER BASIN

MAP PREPARED BY

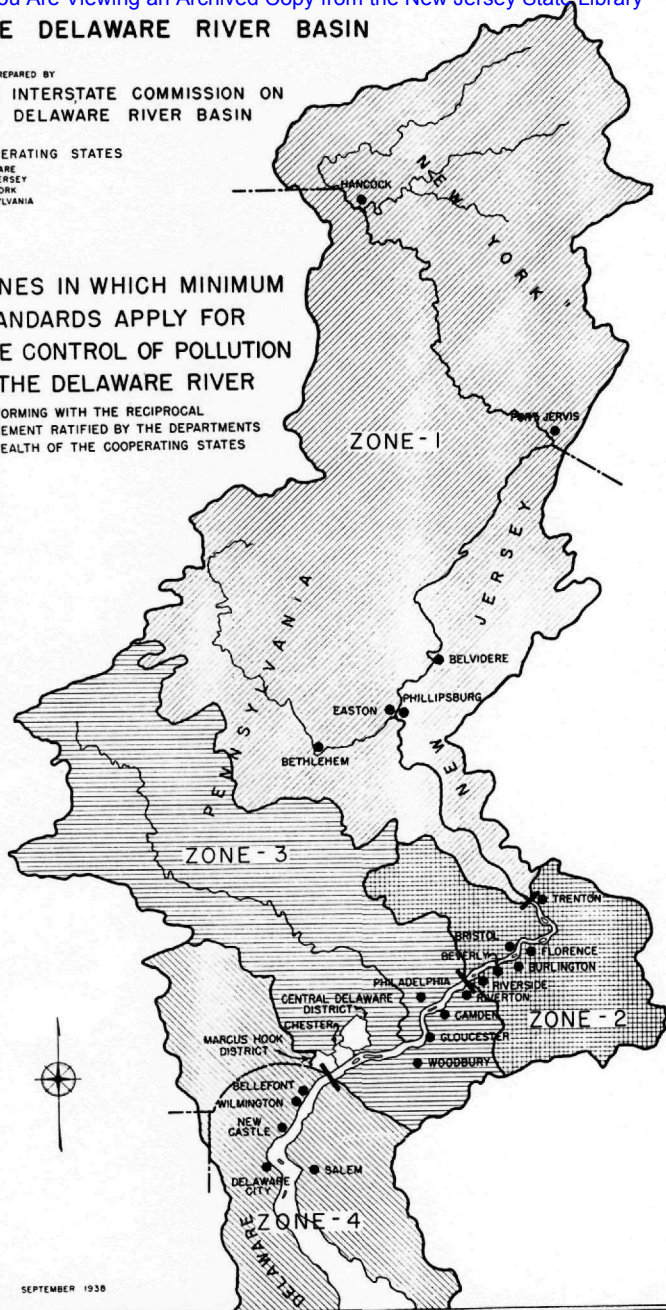
THE INTERSTATE COMMISSION ON
THE DELAWARE RIVER BASIN

COOPERATING STATES

DELAWARE
NEW JERSEY
NEW YORK
PENNSYLVANIA

ZONES IN WHICH MINIMUM STANDARDS APPLY FOR THE CONTROL OF POLLUTION IN THE DELAWARE RIVER

CONFORMING WITH THE RECIPROCAL
AGREEMENT RATIFIED BY THE DEPARTMENTS
OF HEALTH OF THE COOPERATING STATES



SEPTEMBER 1938

II

PROGRESS IN PLANNING

¶ The outstanding achievement in water pollution control in the Delaware River Basin during the past three years has been the preparation and official adoption of an interstate agreement for the correction and control of pollution in the waters of the interstate Delaware River. This Reciprocal Agreement establishes basic standards of cleanliness or purity for the main stream and for its tributaries, at their points of confluence. In addition to the pledge of administrative cooperation by each State Department of Health, the provisions of the agreement have been enacted into law in the states of New Jersey and New York.

¶ To the extent that all sewage construction work in this area, in the future, is to be undertaken in accordance with this interstate plan, covering the drainage basin as a unit, and to the further extent that all new construction work is to be undertaken in logical sequence, insofar as possible, there is assurance that the large and necessary expenditures of public funds involved will be soundly and productively invested.

¶ Progress includes preliminary official action in the way of studies and adoption of projects, in addition to actual construction. The City of Philadelphia, through the Philadelphia Authority, has an application pending with the Reconstruction Finance Corporation for a loan of 60 million dollars to complete the city's comprehensive plan of sewage collection and treatment, as well as to rehabilitate the water system. The New Jersey Board of Health has recently served legal orders on the cities of Camden, Gloucester, Beverly and the Borough of Riverton directing them, in line with the interstate agreement, to discontinue their discharge of insufficiently treated sewage into the Delaware River by November 1, 1941.

DISCUSSION

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During the past three years the achievement in organization for planned progress in pollution control has been outstanding. A coordinated plan governing the degree and type of sewage treatment for each city along the Delaware was essential, for just as the causes and effects of water pollution are regional in scope, touching a wide variety of interests and communities, so it is apparent that no single locality, no single state, can adopt the means of public control necessary to put and maintain the waters of the Delaware River in a clean and sanitary condition. It is an interstate problem on an interstate stream.

The Incodel Advisory Committee on Quality of Water in the Delaware River Basin consists of the chief engineers of the State Departments of Health of Delaware, New Jersey, New York, and Pennsylvania. Since 1936, these administrative agents, who are the responsible officials in each of the state governments for the correction and control of water pollution, have been meeting together pooling their knowledge and the resources of their departments in a unified, concerted attack on the problem of water pollution.

Classification of Zones

The key problem in planning for pollution abatement is to determine upon those reasonable standards of water quality for each section of a stream which express the best balance between the stream's use as a natural sanitation system and its use for other purposes, aesthetic and economic. In the Delaware River Basin, human use of land and water varies as widely within the watershed as does the quality and quantity of water.

To conserve and protect the land and water resources of the Upper Basin for their proper use as sources of public water supplies, after treatment or purification, and for recreational facilities; to preserve and improve public health, to protect and attract industry, to conserve fish and other aquatic life, to aid navigation in the Lower Basin, demands a restoration and maintenance of the purity of waters of the Delaware River and its tributaries through the adoption of standards of water quality based upon the natural condition of the water in relation to its present and potential use.

Practical application of this principle has been made in the Delaware River Basin by means of the following geographical-

areal divisions which serve as the basis for the interstate plan of pollution abatement and control:

ZONE 1: Zone 1 is that part of the Delaware River and its West Branch extending from the New York-Pennsylvania boundary line to the head of tidewater at Trenton, New Jersey, and Morrisville, Pennsylvania.

The drainage basin contributory to this zone, excepting part of the Lehigh River Basin, is relatively sparsely inhabited and contains few sewered communities and relatively few industrial establishments producing waste water. The streams draining this area being, in general, relatively clean and of high elevation, are well adapted as sources of public water supplies, after treatment or purification.

The principal uses of the waters of the Delaware River in Zone 1 are expected to be for water supply after such treatment or purification as may be necessary, and for recreation, bathing, maintenance of fish and aquatic life, agriculture, and for other related purposes.

ZONE 2: Zone 2 is that part of the Delaware River extending from the head of tidewater at Trenton, New Jersey and Morrisville, Pennsylvania, to a line drawn perpendicular to the channel of the Delaware River from the mouth of Pennypack Creek in Philadelphia, Pennsylvania, to the corresponding point on the New Jersey shore.

The drainage basin contributory to this zone is somewhat more densely populated than that of Zone 1, and it contains more sewered communities and industrial establishments.

The principal uses of the waters of the Delaware River in Zone 2 are expected to be for water supply, after treatment or purification, and for recreation, navigation, maintenance of fish and aquatic life, agricultural, industrial and other purposes.

ZONE 3: Zone 3 is that part of the Delaware River extending from the aforesaid line connecting the mouth of Pennypack Creek in Philadelphia and the corresponding point in New Jersey to the Pennsylvania-Delaware boundary line.

The drainage basin contributory to this zone contains populous metropolitan areas including Philadelphia, Pennsylvania, and Camden, New Jersey.

The principal uses of the waters of the Delaware River in Zone 3 are expected to be for navigation, industrial water supply, and other purposes.

The water in this zone, however, should be of such sanitary quality that it will not be unfit for use as sources of water supply, will not be harmful to fish life, and will not adversely affect the quality of the waters of the tidal tributaries.

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MINIMUM STANDARDS OF PURITY FOR EFFLUENTS DISCHARGED INTO DELAWARE RIVER WATERS

Zone	Floating Solids	Suspended Solids	Turbidity	Organic Substances	Coliform Organisms	Acids, Alkalis	Odors & Tastes
1	Not noticeable	Practically free	Not noticeable	85 percent biochemical oxygen demand reduction and not over 50 parts per million. Shall not reduce dissolved oxygen content by more than 5 percent.	1 per cubic centimeter in 10 percent of samples. 100 per cubic centimeter in any single sample.	Not to menace public health through use of water supplies, for recreation, bathing, agriculture, and other purposes. Not inimical to fish or aquatic life.	Free of odors and substances producing taste in water supply
2	Not noticeable	Practically free	Not noticeable	85 percent biochemical oxygen demand reduction and not over 100 parts per million. Shall not reduce dissolved oxygen content by more than 10 percent.	1 per cubic centimeter in 25 percent of samples. 100 per cubic centimeter in any single sample.	Same as above.	Same as above.
3	Not noticeable	Substantially free. Reduction of at least 55 percent.	Not substantial	Reduction necessary to restore biochemical oxygen demand of water to at least 50 percent.	Must be treated with a germicide if discharged within 2 miles of waterworks intake.	Not to menace public health through water supplies or render unfit for industrial purposes, or harmful to fish life.	Practically free.
4	Not noticeable	Same as above.	Not substantial	Such treatment as may be needed to prevent a nuisance.	Must be effectively treated with a germicide if discharged within prejudicial influence of water intake, or recreation areas, or shellfish grounds.	Not to menace public health through water supplies or render unfit for commercial fishing, shellfish culture, recreational, industrial, or other purposes.	Practically free.

According to the interstate agreement, now in effect, the effluent from each municipal and industrial plant must meet the standards outlined above, by all seven tests, for the zone of the river into which the effluent is discharged.

ZONE 4: Zone 4 is that part of the Delaware River extending from the Pennsylvania-Delaware boundary line to the Atlantic Ocean.

The principal uses of the waters of the Delaware River in Zone 4 are expected to be for navigation, industrial water supplies, commercial fishing, shellfish culture, recreation and other purposes.

Minimum Requirements

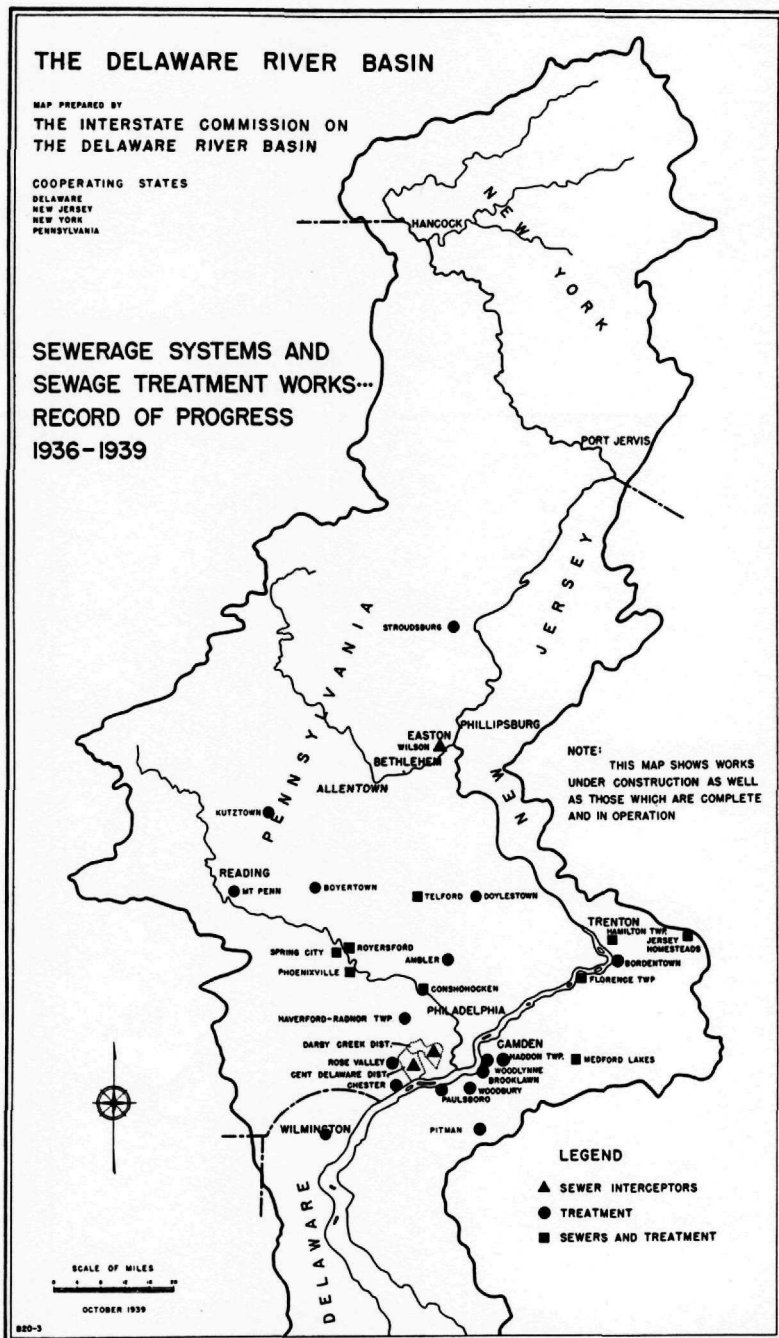
Thus recognizing that no single standard of sewage and waste treatment, and of quality of receiving waters is practical for all parts of the river, the preparation of "minimum requirements" for the attainment of correction and control of pollution, appropriate to the varied uses of the stream, was next undertaken. A summation of these requirements, in tabular form, appears on the facing page. The states have agreed to prohibit the discharge of any sewage, industrial waste, or other artificial polluting matter, into the Delaware River unless it shall have been so treated as to produce an effluent which will meet these minimum requirements; similarly, the states have agreed that the quality of the intrastate tributaries, at their confluence with the Delaware, shall be at least equal to the quality of the waters of the interstate stream.

The Agreement in Action

The states of Delaware, New Jersey, New York, and Pennsylvania, through their appropriate administrative departments have agreed to act in unison toward the common end of abating and preventing excessive pollution in the interstate Delaware River and its tributaries. Whereas there was once a lack of understanding of responsibilities, there is now a well-understood, aggressive, and positive plan of action which has been formulated *by* the states, *for* the states. Successful administration of the terms of this interstate agreement rests with those officials of the State Departments of Health who have collaborated in formulating the specific statements of policy.

With the single exception of the smaller and more homogeneous Hudson Bay area, no comparable interstate plan for the correction and control of water pollution has been devised for any drainage basin in the nation.

The Interstate Commission on the Delaware River Basin believes that progress in planning for pollution control in the Delaware River Basin has been outstanding in the period 1936-1939.



III

PROGRESS IN CONSTRUCTION

- ¶ In the past three years, from 1936 to 1939, more than ten million dollars was spent in the construction of sewage collection and treatment works in the Delaware River Basin.
- ¶ Municipalities in southeastern Pennsylvania have spent in excess of seven million dollars; the remaining three million was expended in municipalities of southern New Jersey.
- ¶ The present population served by the improvements constructed totals 282,500, of which 219,500 reside in Pennsylvania municipalities and 63,000 in New Jersey municipalities.
- ¶ The sewage collection and treatment works constructed include all types, varied as to the specific needs of the municipalities for primary or secondary treatment plants, interceptors, pumping stations, outfalls, or other facilities. Substantial improvements, defined as progress, may bring the projects to one of several stages in the process of attaining adequate sewage collection and treatment systems.
- ¶ While the responsibility for water pollution abatement is primarily local, the progress noted in construction has been accelerated by the availability of federal funds through the public works and work-relief programs. Approximately 90 per cent of the work done was accomplished with the use of federal funds as grants-in-aid, or loans, or both.
- ¶ Construction work progress has been concentrated in the chief problem area, the tidal estuary section of the river, into which the wastes from the Philadelphia-Camden metropolitan region are discharged.

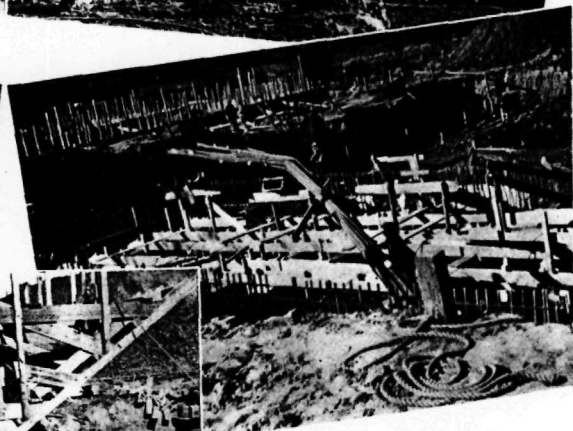
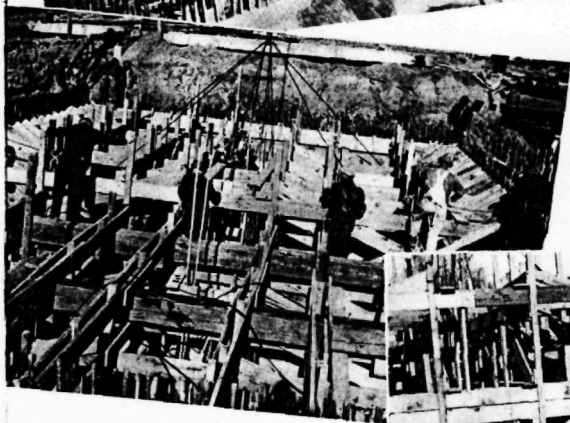
THE INTERSTATE COMMISSION ON THE DELAWARE RIVER BASIN

SEWAGE COLLECTION AND TREATMENT WORKS CONSTRUCTED 1936-1939

STATE OF NEW JERSEY

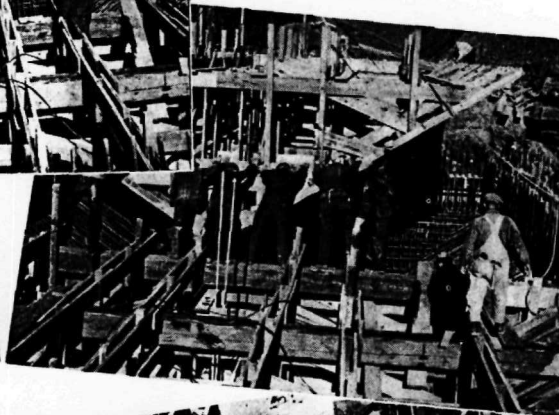
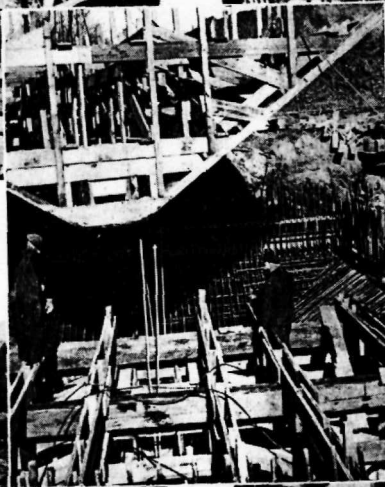
Municipalities	Type of Sewage Collection and Treatment Works Construction	Population Served*	Approximate Cost
Bordentown	Secondary Treatment Facilities	4,000	\$ 40,000
Brooklawn	Primary Treatment Plant	1,000	40,000
Florence Township	Sewerage System and Primary Treatment Plant	3,000	234,000
Haddon Township	Primary and Secondary Treatment Plant	4,000	126,000
Hamilton Township	Sewerage System and Primary and Secondary Sewage Treatment Plant	20,000	2,000,000
Jersey Homesteads	Sewerage System and Primary and Secondary Sewage Treatment Plant	1,000	100,000
Medford Lakes	Sewerage System and Primary and Secondary Sewage Treatment Plant	1,000	220,000
Paulsboro	Primary Treatment Plant	7,000	70,000
Pittman	Secondary Treatment Facilities	9,500	32,000
Woodbury	Primary Treatment Plant	9,000	150,000
Woodlynne	Primary Treatment Plant	3,500	40,000
TOTAL		63,000	\$3,052,000

*Population Served includes only the present population which is served by the improvements constructed; it does not indicate the capacity of the works to care for future demands.



Construction
In
Progress

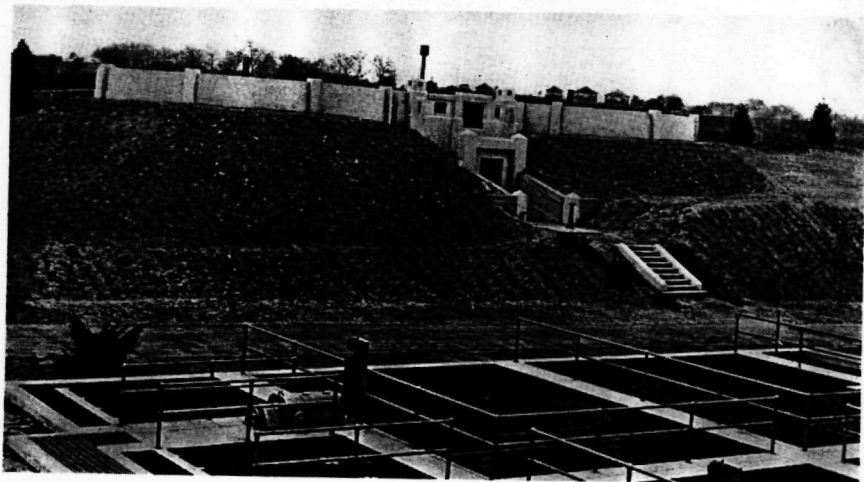
Sewage Treatment
Plant: Woodbury,
New Jersey.



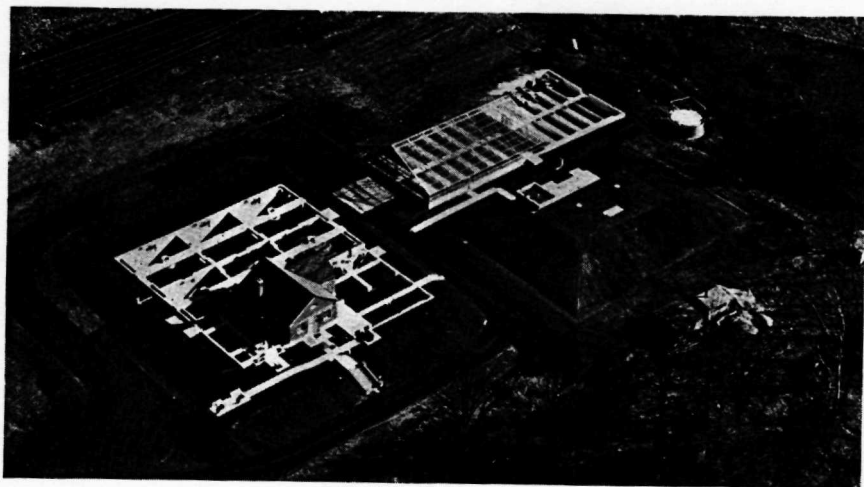
**THE INTERSTATE COMMISSION ON THE DELAWARE RIVER BASIN
SEWAGE COLLECTION AND TREATMENT WORKS CONSTRUCTED 1936-1939
COMMONWEALTH OF PENNSYLVANIA**

Municipalities	Type of Sewage Collection and Treatment Works Construction	Population Served*	Approximate Cost
Ambler	Primary and Secondary Treatment Plant	4,500	\$ 120,000
Boyertown	Primary and Secondary Treatment Plant	4,000	150,000
Chester	Primary Treatment Plant	60,000	500,000
Central Delaware Authority			
District, Delaware County	Interceptors, Pumping Station and Cutoff	22,000	1,200,000
Conshohocken	Sewerage System and Primary Treatment Plant	12,000	900,000
Darby Creek Authority			
District, Delaware County	Intercepting Sewers and Pumping Station	55,000	1,150,000
Doylestown	Primary and Secondary Treatment Plant	4,500	80,000
Haverford-Radnor Townships	Primary and Secondary Treatment Plant	15,000	370,000
Kutztown	Primary and Secondary Treatment Plant	4,000	150,000
Mt. Penn	Primary and Secondary Treatment Plant	3,000	125,000
Phoenixville	Sewers and Primary and Secondary Plant	12,000	900,000
Royersford	Sewerage System and Primary Treatment Plant	4,000	800,000
Rose Valley	Primary and Secondary Treatment Plant	500	70,000
Spring City	Sewerage System and Primary Treatment Plant	3,000	233,000
Stroudsburg	Primary and Secondary Treatment Plant	6,000	180,000
Telford	Sewers and Primary and Secondary Treatment Plant	2,000	100,000
Wilson	Sewers and Interceptors (Treatment at Easton)	8,000	500,000
TOTAL		219,500	\$7,528,000

*Population Served includes only the present population which is served by the improvements constructed; it does not indicate the capacity of the works to care for future demands.



Phoenixville, Pennsylvania, Sewage Treatment Works, completed in 1939.



Sewage Treatment Works, Ambler, Pennsylvania, 1936.

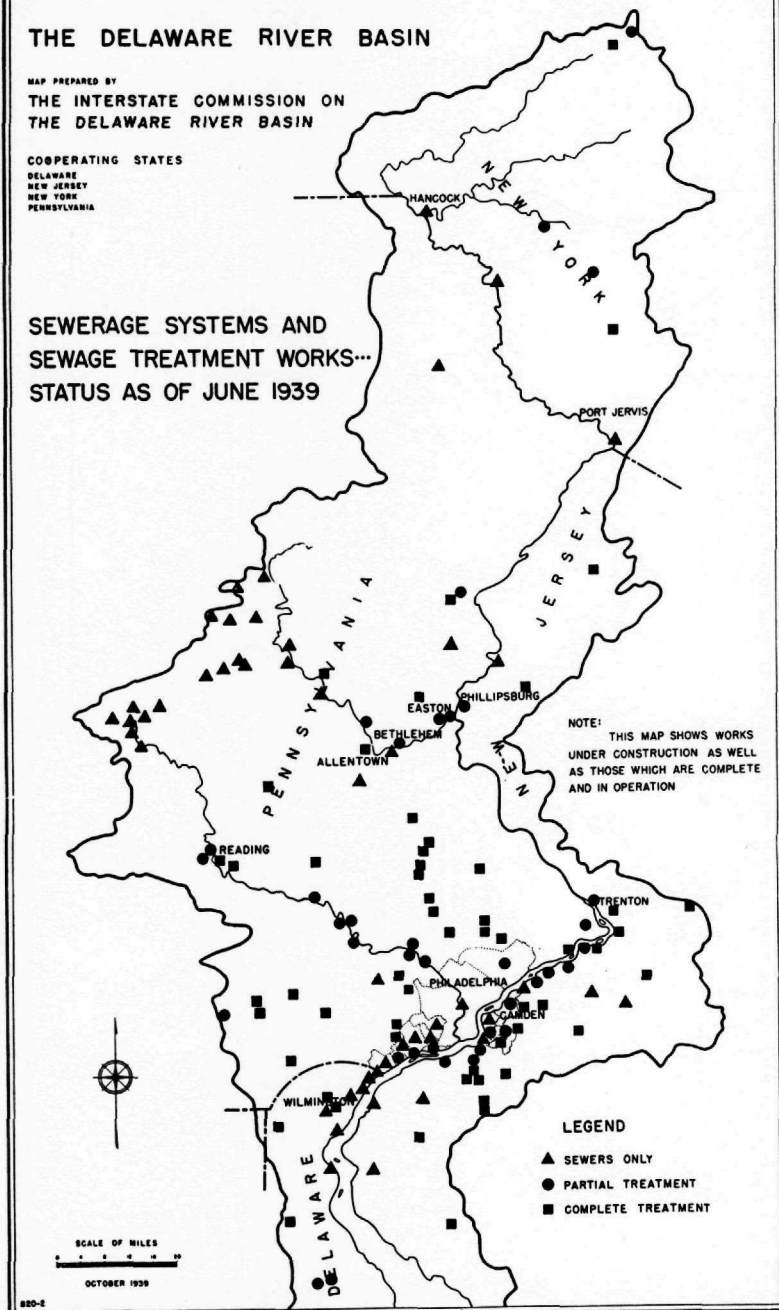
THE DELAWARE RIVER BASIN

MAP PREPARED BY
THE INTERSTATE COMMISSION ON
THE DELAWARE RIVER BASIN

COOPERATING STATES

DELAWARE
NEW JERSEY
NEW YORK
PENNSYLVANIA

SEWERAGE SYSTEMS AND
SEWAGE TREATMENT WORKS...
STATUS AS OF JUNE 1939



IV FOR THE FUTURE

While the emphasis in this report of progress has been placed on happenings of the past three years, the map which appears on the opposite page gives an over-all picture of water pollution control in the Basin. A great amount of work has been done in this watershed.

More than 80 per cent of the five million persons living in the Delaware River Basin enjoy the advantage of having a public sewerage system serve them in carrying domestic wastes away from their homes and places of occupation. Comparable attention has not been given to protection against stream pollution through subjecting those wastes to sewage treatment processes. The "used water" of almost two-thirds of the Basin's population is discharged into the Delaware River and its tributaries without any effort to condition it properly for final disposal.

The total volume of treated and untreated domestic sewage discharged into the Delaware system of streams is estimated to amount to a half-billion gallons daily. Of this amount, Pennsylvania contributes more than 75 per cent; New Jersey about 20 per cent; Delaware and New York combined, the remaining 5 per cent.

Of the 128 incorporated municipalities in the Delaware River Basin with more than 2,500 population, 110 have public sewer systems and 67 have provided, in addition, sewage treatment plants which condition approximately 36 per cent of the total volume of sewage before it is discharged into the Delaware River system.

Since sewage volume, however, is directly proportional to the density of population, such statistics, for the Basin as a whole, are not especially pertinent: the zone of population concentration, in the Philadelphia-Camden metropolitan area, weights figures for the entire drainage basin to a disproportionate degree. The two major cities in that area contribute more than half of the total burden of untreated domestic sewage which is dumped unwarrantedly into the stream.

POLLUTION PREVENTION—ABATEMENT

For the future, the terms of the Reciprocal Agreement for the Correction and Control of Pollution in the Waters of the Interstate Delaware River rigidly prevent further or additional pollution. New municipal sewerage systems, as well as additions to present systems, must in the future produce an effluent at least equal to the minimum requirements. Any new industry locating in the Basin will be forced to comply with the standards adopted for the treatment and disposal of wastes.

The abatement of existing pollution is a costly and time-consuming problem. It is a matter calling for a high degree of understanding and cooperative effort on the part of the State Departments of Health; it depends upon the state of mind and the interest of each municipality involved and on the financial status of municipalities and industries; it depends, finally, upon the manner in which existing and mandatory anti-pollution laws of the states are administered.

The Philadelphia-Camden Area

The City of Philadelphia has long been the key to a solution of the water pollution problem of the Delaware River Basin; it has been in default for a number of years under an agreement with the Pennsylvania State Sanitary Water Board, whereby it promised to spend three million dollars annually on the execution of a comprehensive plan for sewage collection and disposal, devised in 1914. At the present time, almost 80 per cent of the city's domestic sewage is discharged into the Delaware River without treatment of any sort. From Camden, the same proportionate quantity of raw municipal sewage is daily added to the Philadelphia discharge.

The Philadelphia-Camden metropolitan district is responsible for the Delaware River's reputation as the most grossly polluted water area in the nation. With Philadelphia drawing half of its water supply from this source, it follows that no other large city in the nation has an equivalently polluted source of domestic water supply.

Immediate resumption of work in carrying forward to speedy completion the Philadelphia comprehensive plan of sewage collection and treatment is by far the most outstanding and important project in the entire Delaware River Basin. The legal orders recently served by the New Jersey Board of Health

upon the City of Camden, and other municipalities in southeastern New Jersey, requiring them to cease their present pollution of the Delaware River by November, 1941, were based in the main upon the policy represented by Incodel, into which enters the assurance that the Commonwealth of Pennsylvania and the City of Philadelphia, acting in good faith with the cooperative interstate program of pollution abatement and control, will bring about an early correction of the more serious offenses committed by the municipalities in this area.

Cost of Abatement

The cost of the program for abatement of water pollution from municipal wastes in the Delaware River Basin is estimated at 65 million dollars. Again it should be emphasized that the cities of Philadelphia and Camden contribute the major load and will bear a correspondingly larger part of the cost of correction. But whereas it is generally true that pollution abatement works do not benefit the persons who contribute the waste and thus there is a natural tendency to defer action, Philadelphia and Camden, by reason of the tidal action of the river, suffer greatly from their own pollution loads which continually impair Philadelphia's domestic water supply, endanger the use of the water of the entire area for industrial purposes, affect port development, handicap navigation, destroy fish life, reduce property values, and limit the recreational use of the stream and its waterfront by denying opportunities for bathing, boating, highway and park development.

The above estimate of construction costs does not contemplate complete treatment of all municipal wastes. Earlier sections of this report outlined the criteria used in establishing the minimum requirements for the correction and control of pollution in each zone of the river. Optimum use was made of natural purification processes, stream flow differentials, and water uses.

In short, a construction program for the interstate stream, as required by the terms of the interstate agreement, constitutes a reasonable, practicable, and economically sound effort to achieve results immediately and prospectively fair to all concerned.

In the Delaware River Basin, three-fourths of the population is directly affected by the degree of pollution to which the river is subjected. No municipality and no state in this watershed is immune to a substantial interest in this interstate program to prevent and abate pollution in the waters of the interstate stream. Public health requirements, valid economic factors, and less measurable but increasingly important aesthetic considerations, demand the correction and control of abuses of this waterway to protect and preserve its uses.

The Interstate Commission on the Delaware River Basin believes in the character of the program now under way; it believes that this record of progress—in planning and execution, through agreement and construction—points to the practical utility of interstate cooperation in the field of unified water resources control.

The Interstate Commission on the Delaware River Basin was organized in 1926 by the Joint Legislative Commissions on Interstate Cooperation of Delaware, New Jersey, New York, and Pennsylvania. It is engaged in the formulation and execution of a coordinated, unified plan looking to the development, regulation, and control of the resources of the Delaware River Basin as a whole.

Through its Advisory Committee on Quality of Water in the Delaware River Basin, the Commission undertakes, as its first objective, to develop a program for the prevention and abatement of pollution in the Delaware River. An initial report concerning these activities was included in the first volume of this series.

ADVISORY COMMITTEE ON QUALITY

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*Director, Division of Sanitary
Engineering*

NEW YORK

Mr. C. A. HORTON
*Director of Sanitation
Department of Health*

NEW JERSEY

Mr. H. P. CROFT
*Chief Engineer
Department of Health*

PENNSYLVANIA

Mr. W. L. SWANSON
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Department of Health*

