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WATER POLLUTION

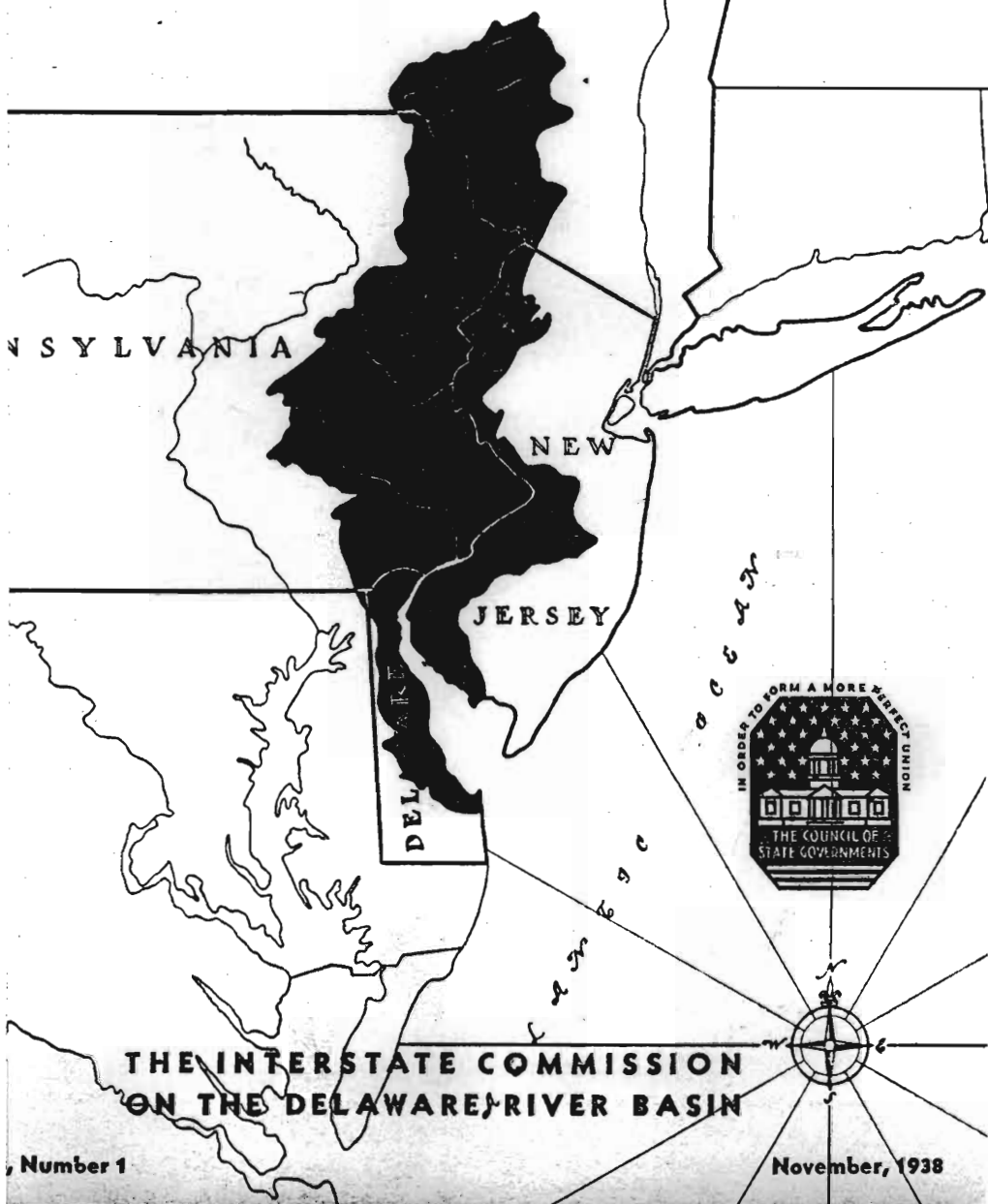
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THE DELAWARE RIVER BASIN WATER POLLUTION

with an introductory section devoted to
general problems of land and water use
NEW YORK



THE INTERSTATE COMMISSION ON THE DELAWARE RIVER BASIN

BROAD STREET STATION BUILDING
PHILADELPHIA, PENNSYLVANIA

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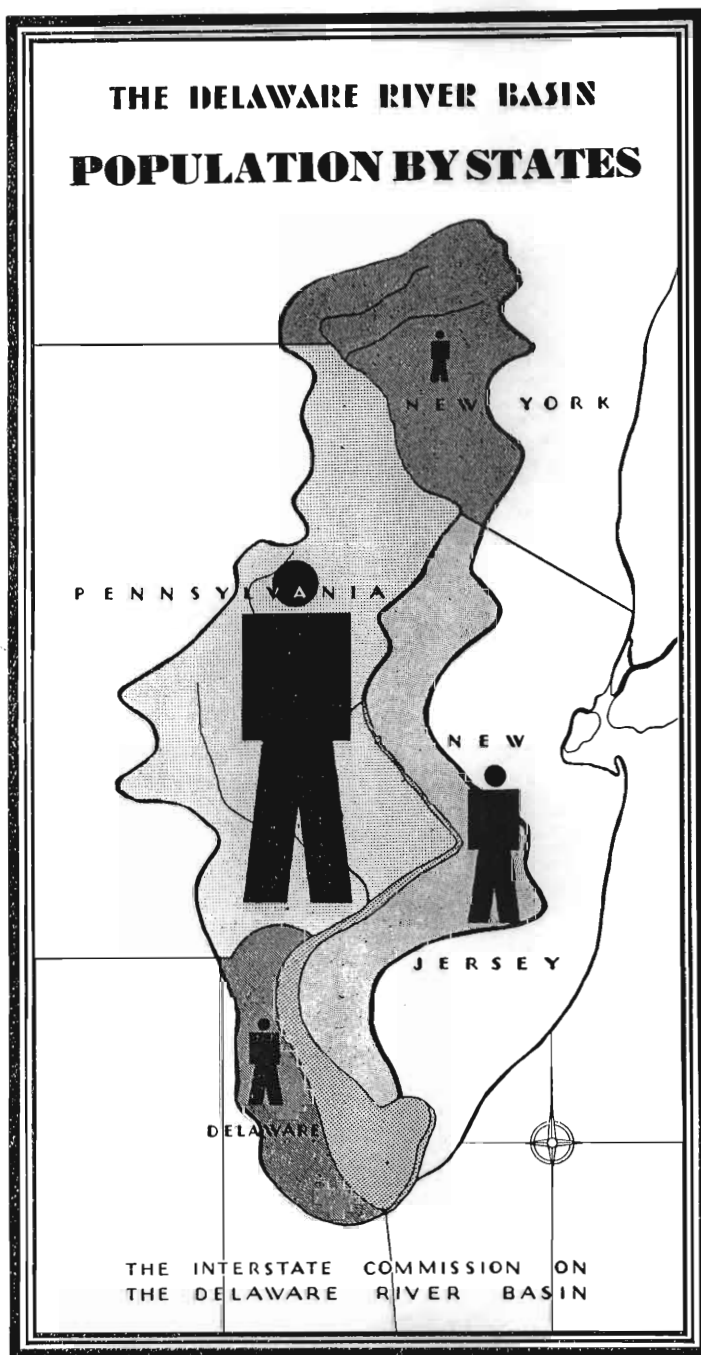
Rising on the western slopes of the Catskill Mountains, in the State of New York, the Delaware River flows southward to the sea as a boundary water, first dividing New York and Pennsylvania, then New Jersey and Pennsylvania, finally New Jersey and Delaware.

The courts have decreed interstate ownership of this waterway. Experience has dictated the need for interstate control of its abundant resources. Since nature has provided the problem in a geographical shape that cuts across existing boundaries, public control has required the creation of a new governmental agency to handle the regional need.

Organized in 1936 by the Joint Legislative Commissions on Interstate Cooperation of New Jersey, New York, and Pennsylvania, the Interstate Commission on the Delaware River Basin is a part of the governmental machinery of the cooperating states, financed entirely from appropriations by those states. It is engaged in the formulation and execution of a coordinated, unified plan looking toward the wise use, development, and control of the natural resources of the Delaware River Basin as a whole.

Through the cooperation of the neighboring states has come the coordinated system of water pollution control published in this, the first of a contemplated series of brochures, designed to inform, educate and guide the five million people of the Delaware River Basin.

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THE DELAWARE RIVER

Its Uses: Its Abuses

The river which proudly bore William Penn on his good ship "Welcome", to the site his scouts had chosen for the proposed "greene countrie town", almost three hundred years ago, was even then ages old. But it was young in countenance—a sparkling, unruffled waterway flowing from high mountains through quiet fields and wild forests unaffected by the few groups of men and women who clung to its banks, depending on the Delaware for communication with the old world and the new.

Three centuries have seen the Delaware River suddenly, as nature reckons time, grown old. Countless millions of gallons of water have been drawn from its apparently limitless supply and returned, after use in homes and industries, polluted with the wastes of domestic and manufacturing processes. In its lower reaches, for this is a progressive difficulty, the river has taken on a new visage, darkened and oily. Flowing by huge metropolitan areas and humming industrial centers which thrive on the river, having built their bounties upon the unrestricted use of this great natural resource, it is choked with an unwanted burden of waste products far beyond the limits of its ability to absorb and purify.

For the five millions of persons now living within the Basin, this change has not wisely been watched in silence. The Delaware River is their major source of water supply. It must be kept relatively pure. It is their means of disposing of domestic and industrial wastes. But it must not be too heavily burdened. It is a potential source of hydro-electric power. These possibilities must be explored. Fish and aquatic life must be preserved; shellfish culture must be unimpeded; navigation interests must be protected.

Public health requirements, valid economic factors, and less practical but increasingly important aesthetic considerations, demand the correction and control of abuses of this waterway, to protect and preserve its uses.

THE DELAWARE RIVER BASIN LAND AND WATER USES



THE INTERSTATE COMMISSION ON
THE DELAWARE RIVER BASIN

THE DELAWARE RIVER BASIN

From the Catskills to the Bay

Here we shall have homes, and there factories; here we shall farm on the rolling, fertile fields and there dig into the earth for coal and building stone; here we shall protect the forests and wild life, there we shall operate lumber mills.

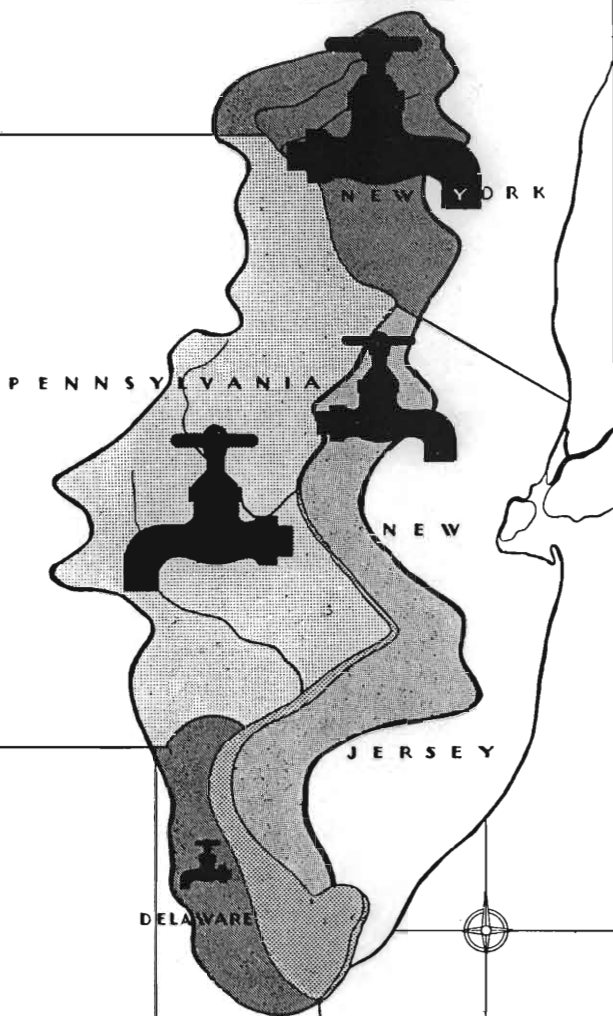
Nature has given its resources abundantly to this region of more than twelve thousand square miles. The uses of this land, unplanned, have been dictated by the conveniences and necessities of a growing population; just now are we taking stock of the resources of the basin, envisioning its future in the light of the best that the basin can give to its citizens, and formulating, therefrom, a design for living which may be used as a guide for future basin development.

Land, water, and people go together: in the Upper Delaware Valley, this combination of human and natural resources has undergone little change in recent decades. It is an area of great scenic beauty and charm. Recreation is its major industry. In the lower basin, the pattern contrasts,—an increasing population, in a series of highly industrialized metropolitan districts in which are massed more than three-quarters of the total population of the watershed.

Comprehensive planning for the proper land and water uses of this drainage basin is planning for the basic resources of the region. No other factors have so influenced its past development; there are no more important considerations for the present and future.

Agricultural, residential, industrial, and recreational interests, each has its place in relation to the others and to the location of the adaptable resources of the region. To balance these interests and resources, so to guide the development of the basin in harmony with the general welfare of the whole people—that, in brief, is the challenge and the obligation.

**THE DELAWARE RIVER BASIN
WATER SUPPLY
PROBABLE FUTURE DEMANDS**



THE INTERSTATE COMMISSION ON
THE DELAWARE RIVER BASIN

THE QUANTITY OF WATER

"A river is more than an amenity, it is a treasure. It offers a necessity of life that must be rationed among those who have power over it. . . . The effort is always to secure an equitable apportionment without quibbling over formulas".

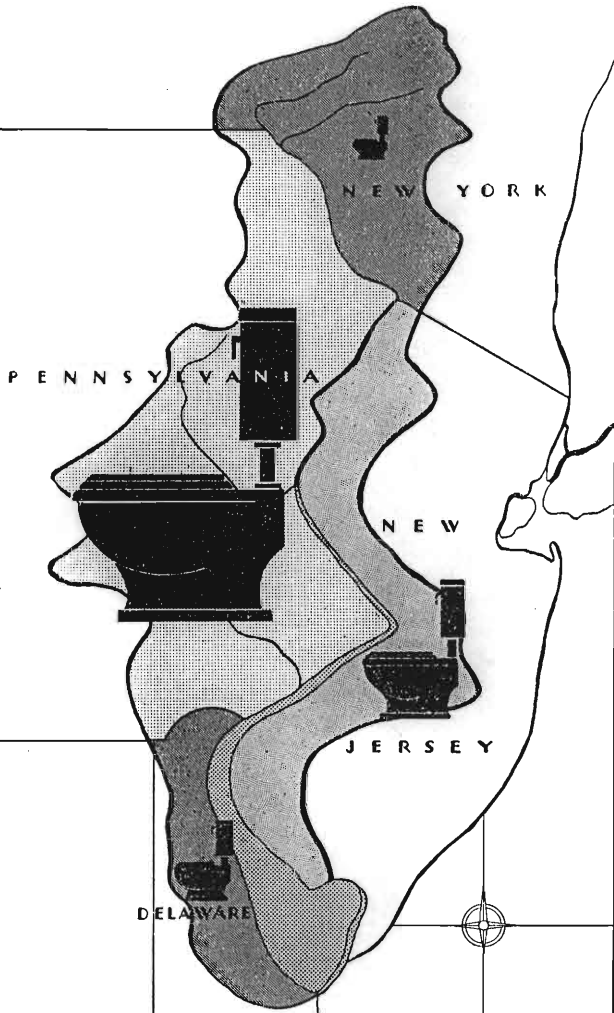
Thus spoke Justice Holmes of the United States Supreme Court in the famous Delaware River Case of 1931, in which the State of New Jersey contested the right of the State of New York and the City of New York to divert 600,000 gallons of water daily from the upper tributaries of the Delaware for use as domestic water supplies.

No respecter of political boundary lines or of the dignity of states, the Delaware River belongs not to any of them, but to New Jersey, New York, Pennsylvania, and Delaware—to each an "equitably apportioned" share.

Under consideration at this moment are public water supply projects for present and future requirements involving a total demand of more than two billion gallons daily from the basin of the Delaware River. Without unity of thought or action, New York City and Philadelphia, southeastern Pennsylvania and northeastern New Jersey, lead in their competitive demands. The quantity is large, too large to visualize, but the supply is ample for all needs.

The use of water for domestic purposes is the highest use to which it can be put. If such are the requirements for the future, and if the effort is to secure "an equitable apportionment without quibbling over formulas" and without resort to costly and time-consuming legal controversies, cooperative planning for future diversions must begin today.

**THE DELAWARE RIVER BASIN
SEWAGE DISPOSAL**



THE INTERSTATE COMMISSION ON
THE DELAWARE RIVER BASIN

THE QUALITY OF WATER

Since the time of the earliest settlement, the Delaware River and its tributaries have become the natural depository for wastes of all kinds. By diluting processes, the river can absorb large volumes of organic and trade wastes. But the gathering of hundreds of industries in the Delaware Valley, and the settling of millions of people in its drainage basin, eventually produced too large and varied a load for the river to assimilate. Its volume of flow has remained almost unchanged, while the amount of domestic sewage discharged into the stream, treated and untreated, can be comparatively pictured, using a population index, as illustrated on the facing page.

The need for an ample supply of relatively pure water for domestic purposes, for industrial uses, for recreation, and for shellfish culture, is ever increasing. Conversely, however, the necessity of utilizing these streams as a natural drainage system for "used water", in the form of sewage and industrial wastes, has progressively reduced the quality of the supply.

Granted that a flowing water supply, instantly available with the turn of a spigot, is a necessity to urban living, a sanitary method of disposing of that water, after use, is essential to protect the quality of the sources of supply as well as to conserve the adaptability of this watershed for recreation, industry, and urban habitation.

The causes and effects of water pollution are regional in scope and include a wide variety of interests and communities. 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.

This circumstance brought with it the opportunity for service in the public interest which the state governments in the Delaware River Basin are, jointly and flexibly, finding it possible to meet.

It is obvious that public control of water pollution in the Delaware River Basin as a whole cannot operate effectively unless there is a well-understood, aggressive, and positive plan of action.

The Interstate Commission on the Delaware River Basin, aided by the advice of the State Departments of Health and their related agencies, has filled this need by establishing basic standards of cleanliness or purity for the main stream, and for its tributaries, at their points of confluence.

These standards are contained in the Reciprocal Agreement, formulated by the Interstate Commission on the Delaware River Basin after months of discussion and negotiation among the governmental officials of the affected states. The terms of this Agreement are printed in full on the following pages.

In substance, for the first time the states have jointly agreed to a code of specifications to be followed by communities and industries of the basin with respect to the treatment and disposal of wastes. This code will enable the proper state authorities to put the agreement in action and to enforce the necessary regulations for every specific locality, for every type of industry.

A RECIPROCAL AGREEMENT

*as drafted and negotiated by the Interstate Commission
on the Delaware River Basin, with subsequent formal
ratification by the State Departments of Health of:*

Delaware-New Jersey-New York-Pennsylvania

For The Correction And Control of Pollution Of The Waters Of The Interstate Delaware River

Whereas, A substantial part of the territory of the States of New York, New Jersey, Pennsylvania and Delaware is situated within the Delaware River drainage basin; and

Whereas, The increase in the population of the various municipal areas situated within the Delaware River Basin, and the growth of industrial activity within the Basin, have resulted in increasingly serious pollution of the waters of the interstate Delaware River and its tributaries; and

Whereas, Such pollution constitutes a grave menace to the health, welfare, and recreational facilities of the people living in the Delaware River Basin, and occasions great economic loss; and

Whereas, The control of future pollution and the correction of existing pollution of the waters of the interstate Delaware River and its tributaries is of prime importance to the people living in the Delaware River Basin and can best be accomplished through the cooperation of the representatives of the people in the Basin, in the States of New York, New Jersey, Pennsylvania and Delaware;

Now therefore, the State of New York and the State of New Jersey and the Commonwealth of Pennsylvania and the State of Delaware agree and are bound as follows:

ARTICLE I

INTERSTATE COOPERATION

Each of the signatory states pledges to each of the other signatory states faithful cooperation in the control of future pollution and in the correction of existing pollution of the waters of the interstate Delaware River and its West Branch from the New York-Pennsylvania boundary line down to the Atlantic Ocean. In order to effect such objects, each of the states agrees to enact adequate legislation, if necessary, to

enable each such state so to require the treatment of sewage, industrial waste or other artificial polluting matter as to place and maintain the waters of the aforesaid interstate Delaware River, and of the tributaries thereof just above the confluence with the Delaware River, in the clean and sanitary condition required by the provisions of this agreement. Furthermore, each such state agrees so to enforce the provisions of these requirements, and other supplementary applicable legislation, if any, as to bring about the attainment of the objectives of pollution control and correction in accordance with such reasonable and effective programs as may be determined from time to time by the states in the manner prescribed herein.

ARTICLE II

CLASSIFICATION OF ZONES

It is recognized by the signatory states that due to such variable factors as location, size, character, and flow, and of the many varied uses of the waters of the interstate Delaware River and its aforesaid West Branch, such as water supply, recreation, navigation, industrial developments, maintenance of fish life, shellfish culture, agriculture, and other purposes, that no single standard of sewage and waste treatment and of quality of receiving waters is practical for all parts of the river. Therefore, in order to apply minimum requirements for the attainment of correction and control of pollution which will be appropriate to the varied factors including the existing and potential quality and uses of the waters, the interstate Delaware River is hereby divided into four zones, to wit:

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.

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.

In order to attain conditions of cleanliness and sanitation of the waters of the Delaware River which will be consistent with the appropriate existing and future quality and uses of such waters, the following minimum requirements shall apply to the several zones herein provided. It is the purpose and intent of such requirements to apply to artificial (not natural) causes of pollution.

THE DELAWARE RIVER BASIN

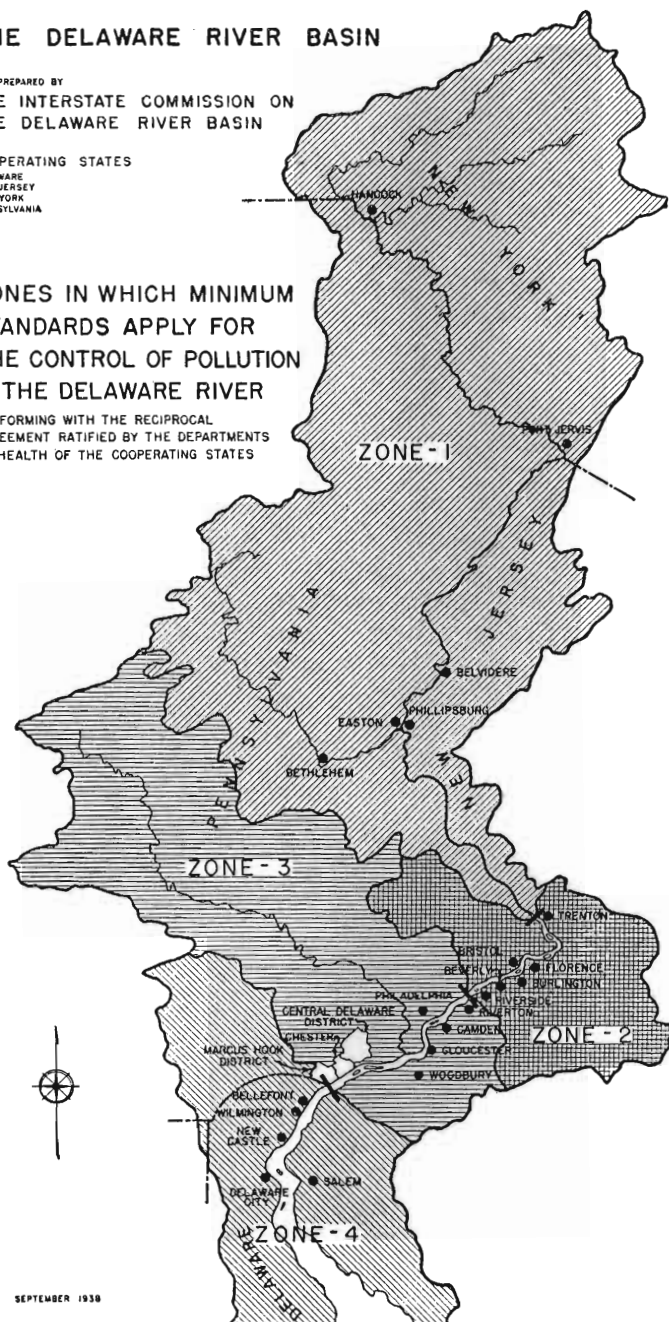
MAP PREPARED BY
THE INTERSTATE COMMISSION ON
THE DELAWARE RIVER BASIN

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

ARTICLE III

MINIMUM REQUIREMENTS

The Interstate Delaware River:

In order to put and maintain the waters of the interstate Delaware River and its West Branch as aforesaid, in a clean and sanitary condition, no sewage, industrial wastes or other polluting matter shall be discharged into, or be permitted to flow or fall into, or be placed in any respective zone of the interstate Delaware River as herein established, unless such sewage, industrial waste or other artificial polluting matter shall first have been so treated as to produce an effluent which will meet the following minimum requirements:

ZONE 1: 1. Such effluent shall be free of noticeable floating solids, color, oil, grease, or sleek, and practically free of suspended solids.

2. Such effluent shall be sufficiently free of turbidity that it will not cause noticeable turbidity in the water of the Delaware River.

3. Such effluent shall show a reduction of organic substances of at least eighty-five (85) per cent as measured by the biochemical oxygen demand, and furthermore, such effluent in no case shall exceed a bio-chemical oxygen demand of fifty (50) parts per million, and furthermore, the discharge of such effluent, after dispersion in the water of the river, shall not cause a reduction of the dissolved oxygen content of such water of more than five (5) per cent. The aforesaid reduction in dissolved oxygen content shall be determined by the average results obtained from dissolved oxygen tests made upon samples collected on not less than six (6) consecutive days from points in the river above and below the point or points of effluent discharge.

4. Such effluent shall be of such quality that the most probable number of organisms of the Coli Aerogenes group shall not exceed one (1) per milliliter in more than ten (10) per cent of the samples of sewage effluent tested by the confirmed test, and provided further that no single sample shall contain more than one hundred (100) organisms of the Coli Aerogenes group in one (1) milliliter

5. Such effluent shall be sufficiently free of acids, alkalis, and other toxic or deleterious substances, that it will not create a menace to the public health through the use of the waters of the Delaware River for public water supplies, for recreation,

bathing, agriculture and other purposes; nor be inimical to fish, animal or aquatic life.

6. Such effluent shall be free of offensive odors and also be free of substances capable of producing offensive tastes or odors in public water supplies derived from the Delaware River at any place below the discharge of such effluent.

ZONE 2: 1. Such effluent shall be free of noticeable floating solids, color, oil, or grease, and practically free of both suspended solids and sleet.

2. Such effluent shall be sufficiently free of turbidity that it will not cause noticeable turbidity in the water of the Delaware River.

3. Such effluent shall show a reduction of organic substances of at least eighty-five (85) per cent as measured by the biochemical oxygen demand, and furthermore, such effluent in no case shall exceed a biochemical oxygen demand of one hundred (100) parts per million, and furthermore, the discharge of such effluent, after dispersion in the water of the river, shall not cause a reduction of the dissolved oxygen content of such water of more than ten (10) per cent. The aforesaid reduction in dissolved oxygen content shall be determined by the average results obtained by dissolved oxygen tests made upon samples collected on not less than six (6) consecutive days from points in the river above and below the point or points of effluent discharge.

4. Such effluent shall be of such quality that the most probable number of organisms of the Coli Aerogenes group shall not exceed one (1) per milliliter in more than twenty-five (25) per cent of the samples of sewage effluent tested by the confirmed test, and provided further that no single sample shall contain more than one hundred (100) organisms of the Coli Aerogenes group in one (1) milliliter.

5. Such effluent shall be sufficiently free of acids, alkalis, and other toxic or deleterious substances, that it will not create a menace to the public health through the use of the water of the Delaware River for public water supplies, for recreation, industrial and other purposes; nor be inimical to fish, animal or aquatic life.

6. Such effluent shall be free of offensive odors and also be free of substances capable of producing offensive tastes and odors in public water supplies derived from the Delaware River at any place above or below the discharge of such effluent.

ZONE 3: 1. Such effluent shall be free of noticeable floating

solids, oil or grease, and substantially free of both suspended solids and sleek.

2. Such effluent shall be sufficiently free of turbidity that it will not cause substantial turbidity in the water of the Delaware River after dispersion in the water of the river.

3. Such effluent shall show a reduction of at least fifty-five (55) per cent of the total suspended solids and a reduction of not less than thirty-five (35) per cent of the bio-chemical demand. (It is the intent of this requirement to restore the dissolved oxygen content of the river water in this zone to at least fifty (50) per cent saturation. To accomplish this, it may be necessary in the case of certain wastes, to obtain reductions greater than those required under this item).

4. Such effluent, if it be discharged within two miles of a public water works intake or within prejudicial influence thereof, shall at all times be effectively treated with a germicide.

5. Such effluent shall be sufficiently free of acids, alkalis, and other toxic or deleterious substances, that it will not create a menace to the public health through the use of the waters of the Delaware River for public water supplies, or render such waters unfit for industrial and other purposes; or cause the water of the Delaware River to be harmful to fish life.

6. Such effluent shall be practically free of substances capable of producing offensive tastes or odors in public water supplies derived from the Delaware River.

ZONE 4: 1. Such effluent shall be free of noticeable floating solids, oil, or grease, and substantially free of both suspended solids and sleek.

2. Such effluent shall be sufficiently free of turbidity that it will not cause substantial turbidity in the waters of the Delaware River after dispersion in the water of the river.

3. Such effluent shall show a reduction of at least fifty-five (55) per cent of the total suspended solids and shall be subject to such further treatment as may be needed to prevent a nuisance.

4. Such effluent, if it be discharged within prejudicial influence of a public water works intake, or of recreational areas, or of shell fish grounds, shall at all times be effectively treated with a germicide, except that in the case of recreational area influence, such treatment need not be provided during the period from October 15th to May 15th of each year.

5. Such effluent shall be sufficiently free of acids, alkalis, and other toxic or deleterious substances that it will not create a

menace to the public health through the use of the waters of the Delaware River for public water supplies, or render such waters unfit for commercial fishing, shell fish culture, recreational, industrial or other purposes.

6. Such effluent shall be practically free of substances capable of producing offensive tastes or odors in public water supplies derived from the Delaware River.

Intrastate Tributaries:

It is further recognized by the signatory states that the quality of the waters of the intrastate tributaries of the Delaware River and its aforesaid West Branch are of interstate concern at their points of confluence with the Delaware River and its West Branch. Therefore, it is also agreed that sewage, industrial waste or other artificial polluting matter discharged into, or permitted to flow or to fall into, or be placed in any intrastate tributary of the aforesaid Delaware River, shall be treated to that degree, if any, necessary to maintain the waters of such intrastate tributary immediately above its confluence with the aforesaid Delaware River in a condition at least equal to the clean and sanitary condition of the waters of the Delaware River immediately above the confluence of such tributary.

Standard Methods:

Analyses and tests regarding the minimum requirements herein prescribed, shall be determined in accordance with the provisions contained in the American Public Health Association's latest edition on "Standard Methods for the Examination of Water and Sewage."

Future Requirements:

The aforesaid requirements as to treatment of sewage, industrial wastes or other artificial polluting matter and as to the sanitary quality of receiving waters are minima. It is the intent and purpose of these requirements to accomplish reasonable and adequate control and correction of pollution. Due to the many variable factors involved, however, and to the impossibility of forecasting future developments with certainty, it may be necessary in the future to impose additional requirements, particularly in Zones 2 and 3.

The minima herein prescribed therefore, shall be considered the first steps toward attaining the objectives sought, and if necessary, may be required to be supplemented in the case that the general application of such minimum requirements does not adequately improve and maintain the sanitary quality of the waters of the Delaware River.

THE DELAWARE RIVER BASIN

**MUNICIPAL SEWAGE TREATMENT FACILITIES
EXISTING AND REQUIRED**

The following table lists, by zones, the type of existing sewage treatment facilities for each municipality now discharging domestic sewage in the interstate Delaware River together with the municipal construction projects necessary to maintain and improve the quality of the Delaware River in accordance with the minimum requirements established by the Interstate Commission on the Delaware River Basin and agreed to by the State Departments of Health of Delaware, New Jersey, New York, and Pennsylvania.

Municipality	Existing Sewage Treatment Facilities	Required Sewage Treatment Facilities
Zone 1		
Hancock, New York	None	Complete
Port Jervis, New York	None	Complete
Easton, Pennsylvania	Primary	Complete
Phillipsburg, New Jersey	Primary	Complete
Zone 2		
Trenton, New Jersey	Primary	Complete
Florence, New Jersey	Primary	Complete
Burlington, New Jersey	Primary	Complete
Bristol, Pennsylvania	Primary	Complete
Beverly, New Jersey	Primary	Complete
Riverside, New Jersey	Primary	Complete
Zone 3		
Riverton, New Jersey	None	Primary
Philadelphia, Pennsylvania	Primary for about 20% of sewage flow	Primary for 100% flow
Camden, New Jersey	Primary for about 20% of sewage flow	Primary for 100% flow
Chester, Pennsylvania	Primary	Primary
Central Delaware County Communities, Pennsylvania	None	Primary
Gloucester, New Jersey	None	Primary
Lower Delaware County Communities, Pennsylvania	None	Primary
Zone 4		
Wilmington, Delaware	None	Primary
New Castle, Delaware	None	Primary
Bellefont, Delaware	None	Primary
Delaware City, Delaware	None	Primary
Salem, New Jersey	None	Primary