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REPORT

SETTING FORTH

Recommendations as to Policy, Legislation and Methods of Financing for the Preservation of the Water Supply Resources of the State of Maryland

TO THE

GENERAL ASSEMBLY OF MARYLAND

BY THE

Water Resources Commission of Maryland

January, 1933

Complying with Chapter 247, Acts of the 1931 Session of the General Assembly of Maryland

"When the well's dry, they know the worth of water."
—Benjamin Franklin.

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THE ADVISABILITY OF CREATING A WATER RESOURCES COMMISSION IN MARYLAND, VESTED WITH THE NECESSARY POWER FOR THE PRESERVATION, ALLOCATION, CONTROL AND REGULATION OF SURFACE AND UNDERGROUND WATER RESOURCES OF THE STATE OF MARYLAND.

LETTER OF TRANSMITTAL.

To the General Assembly of Maryland,

Gentlemen:—During the Session of 1931 of the General Assembly of Maryland, an Act was passed, Chapter No. 247, providing for the establishment of a Water Resources Commission of Maryland, charged with the duty of reviewing the underground and surface water resources of the State of Maryland and of formulating a plan for the preservation, allocation, control and regulation of such water supply resources for the maximum public benefit, safety and use.

The Commission, having been duly appointed, entered upon the duties required by the Act, and in accordance therewith has the honor to submit herewith to your honorable body the results of its labors.

It likewise attaches a draft of such legislation as it deems necessary for the accomplishment of the purposes contemplated by the law under which it is acting.

Water Resources Commission of Maryland,

Abel Wolman, *Chairman,*

F. H. Dryden,

Thomas W. Koon,

E. B. Mathews,

Richard Mommers,

Robert B. Morse,

Philip B. Perlman.

January 10, 1933.

REPORT OF THE WATER RESOURCES COMMISSION OF MARYLAND.

SUMMARY OF FINDINGS AND RECOMMENDATIONS.

1. Maryland's fresh-water rivers and smaller streams now supply approximately 1,240,000,000 gallons of water per day. Of this amount, 252,000,000 gallons per day are used for public water supply, 59,000,000 for industry and 928,000,000 for steam power station use. Less than 14,000,000 gallons per day are obtained from underground sources.

2. By 1950, approximately 1,580,000 people within the State, and 800,000 elsewhere (practically all within the District of Columbia), or a total of 2,380,000 persons will require water. Their public water supply demand will be in the neighborhood of 350,000,000 gallons per day. Their probable minimum total requirements, including industrial and steam power station uses, will be 1,500,000,000 gallons per day in 1950.

3. The State of Maryland has established no policy and passed no laws with respect to the conservation, allocation or regulation of water supply uses, either as to priority, purpose, period, place or quantity of use. Although the State, in principle, owns all of the waters within its borders, their uses have not been pursued with any underlying principle of public benefit in view. The practice has been largely determined by chance, with the results at times contrary to public benefit.

4. The streams of the State are highly variable in flow and with few exceptions no effective regulation of their discharges has taken place. The absence of regulation has resulted in hazards of flood and of drought. Examples of objectionable and costly results of non-regulation are cited on the Susquehanna River, the Potomac River, the Patapsco River, the Patuxent River, Seneca Creek, Antietam Creek, Rock Creek and Northwest Branch.

5. The State of Maryland has established no long term policy for the gaging of the flows of its streams. Its operations have been discontinuous, intermittent and haphazard. The necessity of continuous, long term, elementary book-keeping of stream flows, one of the richest resources of the State, cannot be overemphasized.

6. No agency exists in the State of Maryland to which the task is delegated of reviewing the design and of supervising the construction of dams, in spite of the fact that dams have collapsed in Maryland and elsewhere with much destruction of life and property. Maryland is one of the few states in this country in which such an agency has not been established.

RECOMMENDATION.

The Commission recommends the creation of a permanent Water Resources Commission of Maryland, with general powers to formulate a water conservation policy, to control the priority, purpose, period, place and quantity of use of water, and to provide for continuity of stream gaging and for the supervision of dams.

PROPOSED DRAFT OF LEGISLATION.

A BILL

ENTITLED

An Act to declare the policy of the State to control, so far as practicable, the appropriation or use of surface and underground waters of the State; to control the construction, reconstruction and repair of reservoirs, dams and water-way obstructions in any of the waters of the State; to create the Water Resources Commission; to employ such persons, engineering, clerical or otherwise, as may be required, in the performance of its duties and in the exercise of its powers; to devise and develop a general water resources conservation program for the State; to provide for hearings upon applications for permits and to grant permits to appropriate and use the waters of the State or to construct, reconstruct or repair reservoirs, dams and water-way obstructions; to investigate or examine any existing reservoir, dam or water-way obstruction; to make such rules and regulations and issue orders proper for enforcing the purposes of this Act; to provide for appeals from any determination of the Commission, and for penalties for violating its orders and the provisions of this Act.

SECTION 1. *Be it enacted by the General Assembly of Maryland,* That, in order to conserve, protect and utilize the water resources of the State, in accordance with the best interests of the people of Maryland, it is hereby declared to be the policy of the State to control, so far as practicable, the appropriation or use of surface and underground waters of the State. It is also declared to be the policy of the State for the purpose of promoting the public safety and welfare, to control and supervise so far as is practicable, the construction, reconstruction and repair of dams, reservoirs and all other waterworks in any of the waters of the State.

SEC. 2. *And be it further enacted,* That the Water Resources Commission is hereby created. The Commission shall consist of the Chief Sanitary Engineer of the State Department of Health of Maryland, the Chairman of the Public Service Commission of Maryland, the State Geologist, and two other members to be appointed by the Governor. The two members appointed by the Governor shall serve for terms of four years, except that one of the two first appointed shall serve for two years, and his successor for four years, so that the term of one of the two appointed by the Governor shall expire biennially. The terms of those first appointed by the Governor shall begin on the first day of June, 1933. In case of a vacancy, the

Governor shall make an appointment for the unexpired term. All members shall serve without compensation, but they shall be allowed any reasonable expenses incurred in the performance of their duties under this Act. The Governor shall designate the Chairman of the Commission. The Commission shall maintain offices which may be located in any other offices of existing departments of the State. Three members of the Commission shall constitute a quorum, and no action shall be taken or refused unless by the concurring vote of not less than three members. The Commission shall keep permanent and complete records of its proceedings, meetings, hearings, orders and decisions. The Commission is hereby authorized and empowered to employ such persons as may be necessary in the performance of its duties and in the exercise of its powers, engineering, clerical or otherwise, and pay the compensation and incur the necessary expenses, within the limits of appropriations in the Budget Bill.

SEC. 3. *And be it further enacted,* That the Water Resources Commission shall devise and develop a general water resources conservation program for the State. This program shall contemplate the proper conservation, allocation and development of all of the waters, surface and underground, of the State for the best interests of all of the people of Maryland, and shall guide the Commission in the issuing of water, water power, dam, reservoir and other permits, as hereinafter provided. The Commission is hereby authorized and empowered to make, or cause to be made, all such surveys, maps, investigations and studies of the water resources of the State as it may deem necessary to provide it with sufficient information to formulate a program, and to perform its duties under this Act. All other departments, boards, officials and agencies of the State of Maryland are hereby directed to co-operate with and assist the Water Resources Commission in the performance of its duties and powers.

SEC. 4. *And be it further enacted,* That from and after January 1, 1934, it shall be unlawful for the State or any agency thereof, any person or persons, partnership, association, private or public corporation, county, municipality, or other political subdivision of the State, to appropriate or use any waters of the State, surface or underground, without the consent or permit of the Water Resources Commission, in writing, previously obtained, upon written application therefor to the Commission. Nothing in this Section shall be construed to apply to the use of water for domestic purposes serving at any time less than twenty-five persons, or to the use of water for any purpose originating within the geographical limits of any municipality; nor shall it apply to any particular use in existence on January 1, 1934.

SEC. 5. *And be it further enacted,* That from and after January 1, 1934, it shall be unlawful for the State or any agency thereof, any person or persons, partnership, association, private or public corporation, county, municipality or other political subdivision of the State, to construct, reconstruct or repair any reservoir, dam or water-way obstruction; or to make or construct, or permit to be made or constructed, any change therein or addition thereto; or to make, or permit to be made, any change in, addition to, or repair of, any existing water-way obstruction; or in any manner to change or diminish the course, current, or cross-section of any stream or body of water, wholly or partly within, this State, except the tidal waters, without a permit from the Water Resources Commission, in writing, previously obtained, upon written application therefor to said Commission. Nothing in this Section shall be construed to apply to any dam or obstruction which is five feet or less in height above the elevation of the stream bed or water-way, nor shall it apply to any reservoir with a storage capacity of less than one million gallons.

SEC. 6. *And be it further enacted,* That each application for a permit required by this Act shall be accompanied by maps, drawings, and specifications of such proposed use or water-way obstruction, or of the said changes, additions, or repairs, proposed to be made, and such other data and information as the Commission may require.

SEC. 7. *And be it further enacted,* That as soon as convenient after the filing with the Commission of any application for a permit to appropriate or use any waters of the State, or to construct or reconstruct or repair any reservoir, dam or water-way obstruction, in any waters of the State under the provisions of this Act, the Commission shall set a day for a public hearing upon said application. The applicant shall give notice to the public of such application and hearing, either in the manner prescribed by the Commission, or by publication once in each week for two successive weeks prior to said hearing in a daily newspaper published in the city or cities, county or counties, which the Commission shall determine may be directly affected by the proposed appropriation or use, or construction, reconstruction or repair. The County Commissioners of each such county, the Mayor or Chief Executive officials of each such city and the proper officials of any interested agency of the State, or political subdivision thereof, shall also be notified by the applicant by registered mail. In the public notice of such application, the date, place and time fixed by the Commission for the public hearing on said application shall be stated. At such public hearing, the applicant and any other interested person or corporation, municipal or private, shall be given an opportunity to present facts, evidence and arguments for or against the granting of said application.

SEC. 8. *And be it further enacted,* That before acting on any application the Commission shall weigh all of the respective advantages and disadvantages to the public and shall make all appropriate investigations. If the Commission shall be of the opinion from all of the evidence before it that, in pursuance of the policy of the State regarding its water resources herein declared, the plans of the applicant provide for the greatest practicable utilization of the waters of the State and will adequately preserve public safety and will promote the general public welfare it shall grant the permit to appropriate or to use the waters, or to construct, reconstruct or repair the proposed reservoir, dam, or water-way obstruction, or to accomplish any combination of these objects. But if the Commission be of the opinion, from the evidence before it, that the proposed appropriation or use of State waters or that the proposed construction is inadequate, wasteful, dangerous, impracticable, or will be detrimental to the best public interest, the Commission may reject such application or it may suggest such modifications of the proposed plans as it deems sufficient to protect the public welfare and safety. In granting any permit authorizing any use or appropriation of water, or the construction or alteration of any reservoir, dam or water-way obstruction, the Commission may include in the grant thereof such conditions, terms and reservations with respect to the character, amount, means and manner of such use or method of such construction as it may deem reasonably necessary to preserve the proper control in the State and to insure the safety and welfare of the people of Maryland. It shall be unlawful to appropriate or use any waters of the State, or to construct or begin the construction, or to make or begin any change or addition, or reconstruct or repair, any reservoir, dam or water-way obstruction, except in accordance with the terms, conditions, regulations and restrictions of such permit, and such rules and regulations, with regard to said constructions, changes, additions, or repairs as may be prescribed by the Commission. The Commission may determine and specify in each permit granted for the construction of a dam or other waterworks what provisions, if any, should be made for the passage of fish.

SEC. 9. *And be it further enacted,* That upon complaint, or upon its own initiative, the Commission shall have power to cause an investigation or examination to be made of any reservoir, dam, or water-way obstruction now existing or hereafter constructed. If the Commission shall determine that such reservoir, dam or water-way obstruction is unsafe or needs repair, or should be removed as being unsafe and not susceptible of repair, the Commission shall, in writing, notify the owner or owners thereof to repair or remove the same, as the exigencies of the case may require; such work to be commenced and proceeded with to completion within such reasonable time as may be prescribed in such notice by the Commission.

SEC. 10. *And be it further enacted,* That the Commission shall prescribe a time limit of not more than two years from the granting of any permit in which time the construction, reconstruction or repair must be begun and/or the appropriation or use of water must be made. The Commission shall also prescribe a time limit of not more than five years to begin from the granting of any permit in which all construction, reconstruction or repair of reservoirs, dams, or water-way obstruction must be completed. Provided, however, that either or both of these time limits may be extended for good cause in the discretion of the Commission.

SEC. 11. *And be it further enacted,* That the Commission is hereby authorized and empowered to make such rules and regulations, and issue such orders as may be proper for effecting the purposes of this Act.

SEC. 12. *And be it further enacted,* That any person in interest may appeal from any determination of the Commission to the Circuit Court of any county or to the Circuit Court of Baltimore City, in the manner and mode prescribed by Section 404, *et seq.,* of Article 23 of the Annotated Code of Maryland, for appeals from the Public Service Commission of Maryland; and all the provisions of law, so far as applicable, relating to appeals from the Public Service Commission to the Circuit Courts and to the Court of Appeals shall apply to appeals from the Water Resources Commission.

SEC. 13. *And be it further enacted,* That any person or persons partnership, association or corporation, public or private, that shall do or cause to be done, any act or thing contrary to or required by the provisions of this Act; or that shall fail, neglect or refuse to do or cause to be done any act required by the provisions of this Act; or that shall violate or fail to comply with, any order of the Commission of which due notice shall be given; or that shall violate any of the provisions of this Act, shall be guilty of a misdemeanor; and upon conviction thereof, shall be sentenced to pay a fine of not more than one thousand dollars, or, in the discretion of the court, such person or persons, or the members of such partnership or association, or the officers and directors of such corporation, public or private, as the case may be, sentenced to imprisonment for a period not exceeding one year, either or both, in the discretion of the court. In the case of the State or any agency thereof, counties, municipalities, and other political subdivisions of the State, the officials responsible for the violation shall, after hearing, be subject to removal from office by the Governor of the State.

SEC. 14. *And be it further enacted,* That upon application of the Commission, verified by oath or affirmation, the Circuit Court of

any county, or of Baltimore City, sitting in equity, may, by injunction, enforce the compliance with, or restrain the violation of, any order or notice, or rule or regulation, of the Commission made pursuant to the provisions of this Act, or restrain the violation or attempted violation of any of the provisions of this Act. The Attorney General of Maryland shall be Counsel to the Water Resources Commission.

SEC. 15. *And be it further enacted,* That nothing in this Act shall be construed so as to interfere with the exercise of the lawful jurisdiction of the Government of the United States, or its duly constituted agencies, over the waters of the State of Maryland. Nor shall this Act be construed to amend or repeal any law of the State of Maryland relating to the Public Service Commission, and the State Department of Health of Maryland, relating to water and water structures, or any act or parts of acts not inconsistent with the provisions of this Act; nor shall it be construed so as to impair any riparian or other vested right.

SEC. 16. *And be it further enacted,* That in the event that any court of competent jurisdiction should declare any section or part of a section of this Act to be invalid, the remainder of the Act shall not be invalidated thereby, but shall remain in full force and effect.

SEC. 17. *And be it further enacted,* That this Act is in addition to and not in substitution for any existing laws of the State of Maryland.

SEC. 18. *And be it further enacted,* That this Act shall take effect from and after June 1, 1933.

DETAILED REPORT OF WATER RESOURCES COMMISSION OF MARYLAND.

INTRODUCTION.

The General Assembly of Maryland, sitting in regular session in 1931, had before it the disastrous results of the lack of rainfall of the 1930-1931 period and its damaging effects upon water supply uses in the State of Maryland. Development of the water supply resources of the State always has been the concern of a few interested official and unofficial agencies, but the necessity of a crystallized State policy on this matter was never so clearly apparent until the serious difficulties arose from the drought.

A deficiency of rainfall in Maryland in 1930, amounting to almost 50 percent of the normal, demonstrated, in harsher terms than ordinarily, the necessity for some more effective form of regimentation or regulation of surface and underground waters than had hitherto been available. The widespread existence of these obvious problems gave rise to considerable discussion on the part of interested individuals as to what procedure the State might logically pursue for the correction or amelioration in the future of difficult water supply situations. As a result of these deliberations, the Act known as Chapter 247, reproduced below, was passed by the General Assembly of 1931. The following report is herewith submitted in compliance with the direction of that body.

Chapter 247.

A BILL ENTITLED

An Act to authorize the Governor of Maryland to appoint a commission of seven persons to review the underground and surface water resources of the State of Maryland in order to determine upon the most effective plan to preserve and allocate such water supply resources for maximum public benefit and use; to study the problem of regulation of streams by storage reservoirs or other means; to survey the necessity for creating water service districts; to review the present practices and future necessities in the location, design and construction of dams and reservoirs; and to prepare and submit a report to the General Assembly of Maryland of 1933 embodying its findings and recommendations, including a legislative program, if such be found desirable in the light of the Commission's investigations.

Section 1. Be it enacted by the General Assembly of Maryland, That immediately upon the passage of this Act, the Governor of Maryland is authorized to appoint a Commission to be known as the Water Resources Commission of Maryland, to consist of seven members. The Commission shall elect its own chairman and other necessary officers and staff. The members of the Commission shall serve without pay, but may designate such members of its staff for compensation within its budget appropriation as it may consider wise.

Section 2. And be it further enacted, That said Commission is hereby authorized and directed to make such study of the underground and surface water resources in the State of Maryland as may enable it to make recommendations as to the advisability of establishing a policy for the State of Maryland for the preservation and allocation of water supply resources for all purposes and for the maximum benefit and use of the citizens of Maryland; to recommend a plan and submit an estimate of cost for the development of a program for stream flow measurement, recording and publication; to recommend a policy, if necessary, for the establishment of State supervision of the location, design and construction of water supply dams and reservoirs in the State of Maryland; to recommend a plan, if necessary, for developing river improvements so as to prevent damaging floods; to recommend a policy for the future control of actual and potential public water supply resources; to recommend a plan for the regulation of stream flows by storage reservoirs or other means; to survey the necessity for creating water service districts.

Section 3. And be it further enacted, That the Water Resources Commission is hereby authorized and directed to present in writing to the General Assembly of Maryland of 1933 a report setting forth its recommendations as to policy, legislation and methods of financing for the full preservation of the water supply resources of the State of Maryland.

Section 4. And be it further enacted, That this Act shall take effect June 1, 1931.

Approved April 17, 1931.

In accordance with the provisions of the above Act, Governor Ritchie appointed on August 27, 1931, the following individuals to serve as the members of the Water Resources Commission:

Francis H. Dryden, Richard Mommers,
Thomas W. Koon, Robert B. Morse,
Edward B. Mathews, Philip B. Perlman,
Abel Wolman.

The Commission held its first meeting on September 22, 1931, at which time it elected as its Chairman, Abel Wolman. A number of meetings have been subsequently held, at which the reports of various subcommittees, into which the Commission was divided for more efficient functioning, were discussed. By availing itself of the facilities afforded by various State departments, the Commission was able to collect and utilize a vast amount of pertinent information previously scattered or uncollated for the purpose herein presented.

INVENTORY OF WATER RESOURCES.

One of the first concerns of any agency undertaking a review of water supply requirements of a state, is to determine the existing and potential uses of such resources. When the Commission was created, no comprehensive inventory existed of either the surface or underground water resources of Maryland. Its first task, therefore, was to arrange for the preparation of such inventories through the joint efforts of the United States Geological Survey, the Maryland Geo-

logical Survey and the Bureau of Sanitary Engineering of the State Department of Health of Maryland. Complete data as to existing uses of water have been accumulated. They are shown in Appendices A, B and C.

Maryland's fresh-water rivers and streams provide water supplies for most of its communities west of the Chesapeake Bay and in Cecil County, where underground conditions are such as to limit, as a general rule, the water obtainable from wells to quantities insufficient for public demand. Some of the streams, and particularly several of the larger ones rather extensively, prove useful as sources of water supply for industrial works and steam power plants. They have been developed to a considerable extent, also, to provide water power for industries, including that of grist-mill operation, formerly widespread, but now greatly restricted. With a few notable exceptions, slight use has been made of our watercourses for the hydraulic generation of electric current for transmission.

The streams of Maryland, in addition to furnishing water for public, industrial and power requirements serve as channels for the disposal, either with or without previous treatment, of the sewage and trade wastes from all of its sewered communities not situated directly on or near the shores of the Chesapeake Bay or Atlantic Ocean.

Public Water Supply. Fifty-three public water supplies, including the emergency supply at Salisbury, are taken from the streams of this State. These serve 46 independent municipalities, State institutions, camps and water districts in Maryland, and also the District of Columbia, and Piedmont, W. Va. The total population of the communities supplied is approximately 1,600,000, of which 1,100,000 persons live in Maryland. These 1,100,000 people constitute more than 67 percent of the population of the State, and the total number of persons supplied with public water from Maryland's streams is almost as great as the State's population. The water consumption of all communities securing their supplies from Maryland's streams approximates 235,000,000 gallons per 24 hours, 140,000,000 gallons of which are used within the State.

The facts relating to surface public water supplies in Maryland are shown in Appendix B, Table 1, prepared by the State Department of Health. Of the systems tabulated only those of Baltimore and Washington are of large size. That of the Washington Suburban Sanitary District stands third, measured by population served. This system, together with those of Cumberland and Hagerstown, are of moderate proportions. All of the others, except those at Annapolis and Frederick, are small, each producing less than 1,000,000 gallons of water per day.

Although underground sources of water supply are used to a large extent, about 87 supplies being now in service, they account for less

than 14,000,000 gallons per day, a very small part of the total water used in the State. The 87 supplies furnish approximately 120,000 people, including 16 institutions, schools and minor establishments. With few exceptions, the underground water supply situation offers no immediate cause for alarm, although any form of state-wide control desirable for surface waters should also include the regulation of underground sources.

Water Supply for Industry and Power. Industries of various kinds have located near a number of the fresh-water streams of the State and use their water in manufacturing processes. Appendix B, Table 3, furnished by the State Department of Health, reveals that the liquid wastes from these plants in Maryland amount to more than 56,000,000 gallons per 24 hours. This tabulation does not include a number of small works, but is sufficiently complete for present purposes. Although the quantity of water taken for industrial requirements from the streams of the State unquestionably amounts to somewhat more than the total of industrial waste discharge, the figure of 56,000,000 gallons daily serves the needs of approximation. It is undoubtedly an underestimate of the amount actually taken for industrial purposes, because it does not include large amounts of condensing and cooling waters, the volumes of which are difficult to determine.

Among all the streams the Potomac River supplies by far the greatest quantity of water for industrial use inside the boundaries of the State. A total of more than 54,000,000 gallons per 24 hours is taken from that river by industries, located mostly about Cumberland. Several manufacturing plants situated along the Patapsco River account for a large part of the remaining surface water used in Maryland industries.

Steam Power Station Supplies. Steam power plants require large quantities of water for condensing and cooling purposes and comparatively small amounts for boiler make-up. Appendix B, Table 5, prepared by the State Department of Health, records that twelve such stations in this State, with an installed capacity of 471,466 H. P., use more than 923,000,000 gallons of water per day for condensing and cooling purposes and about 1,261,000 gallons as boiler make-up. Nearly 723,000,000 gallons of the condensing and cooling water is taken from upland streams and the remainder from streams in the tidewater district of the State. Streams supply 664,200 gallons per day of make-up water; public water supplies, 525,200, and wells the small balance.

As in the case of industrial use, the Potomac River (including its tributary, Antietam Creek) furnishes almost all the water taken from streams for steam power station use, a total exceeding 268,000,000 gallons per 24 hours.

Water Power. With the exception of the development on the Susquehanna River at Conowingo, with a capacity of 378,000 H. P., and that on Deep Creek, a tributary of the Youghiogheny River, having a capacity of 24,000 H. P., Appendix B, Table 4, prepared by the State Department of Health, shows that the total capacity of the other three hydro-electric plants in Maryland amounts to only about 1,360 H. P. Considering the possibilities, the streams of Maryland, with installations totaling 403,360 H. P., are used only to a slight extent for hydro-electric development. The Susquehanna River, however, has large water power plants in Pennsylvania, at Holtwood and Safe Harbor. Much of the output at these two developments, totaling an additional 405,000 H. P., is or will be transmitted into Maryland. On branches of the Potomac River in Pennsylvania, Virginia and West Virginia, moreover, there are a considerable number of comparatively small hydro-electric developments.

In addition to the rather limited use of Maryland streams as sources of water power in connection with the generation of electricity for transmission, they have been developed to a considerable extent, as noted previously, for furnishing water power used in the operation of manufacturing works and grist mills. Information concerning the total amount of this kind of power developed has not been sought.

FUTURE REQUIREMENTS FOR WATER SUPPLY.

Surface sources now furnish the water supply for the largest and most of the rapidly growing cities of Maryland, as well as the populous suburban sections near Baltimore and Washington. A substantial though slower growth in and around many of the smaller communities now so served is also probable. The rural sections, on the other hand, will probably continue to decrease in population, as a general rule.

Many small towns in the State do not now have public water systems, but can and probably will afford them, either through municipal effort or private enterprise. Many of these towns are located in parts of the State where surface sources of water supply prevail. Scant excuse exists for the absence of water systems in such communities as Grantsville, Clear Spring, Keedysville, Sharpsburg, Myersville, Jefferson, Woodsboro, Libertytown, New Market, Sykesville, Elkridge, Damascus, Poolesville, Germantown, Sandy Spring, Bowie, Marlboro, Indian Head, Odenton, Reisterstown, Glyndon, Cockeysville, Hampstead, Manchester and North East.

All of the above-mentioned factors point toward the rapid expansion of public surface water supplies in Maryland. Probably, by 1950, from 75 to 80 percent of the total population of the State will be thus served. Estimating this population as 1,975,000 and using the higher percentage figure, we may expect the streams of

Maryland to supply, in 1950, the needs of 1,580,000 people in the State, as well as those of approximately 800,000 elsewhere, practically all within the District of Columbia, or a total of 2,380,000. The requirements for this population will amount to about 350,000,000 gallons of water each day.

It is apparent, therefore, that the problem of obtaining sufficient water to meet at all times the requirements for public supply alone will become soon one of major importance and will necessitate the more extensive construction of storage reservoirs on many of our streams. Occasion does not arise at this time to estimate the future demands on each stream, and any attempt to do so would probably result in figures which would not be attained.

The most important sources of water supply at present are the Gunpowder Falls and Potomac River, Evitts Creek, the Patapsco River and its branches, tributaries of the Monocacy River, and Northwest Branch of the Anacostia River. Large storage reservoirs are being constructed on the West Branch of the Gunpowder Falls for Baltimore and on Evitts Creek for Cumberland. Additional important streams admirably adapted for public water supply development, and so situated with respect to centers of population as to merit consideration, include the Savage River, the Patuxent Rivers, Little Gunpowder River, and Seneca, Deer, and Octoraro Creeks. The Savage River has been studied as a source of supply both for Cumberland and for the Georges Creek Valley, while Seneca Creek and the Patuxent Rivers have been strongly recommended for development to serve the Washington Suburban Sanitary District and its environs, together with all the territory northeasterly to Elkridge and southeasterly perhaps as far as Annapolis. The Susquehanna River, in the distant future, may be needed in connection with Baltimore's water supply, but the Potomac River below Westernport probably will not be developed further for public water supply purposes except for Washington and Hagerstown which cities now use it. This prediction has as its basis the increasing pollution of the river from sewage and industrial waste, the hardness of its water, and the existence of upland streams containing water of superior quality.

DEVELOPMENT OF WATER DISTRICTS.

Where municipalities are located at short distances from each other or where, as in Maryland, both incorporated and unincorporated communities requiring public water service exist in the vicinity of the cities and larger towns, much expense may be saved and more satisfactory service rendered by joint action in connection with both water supply and distribution. Duplication of supply, purification and pumping works, as well as supply and arterial distribution mains,

is thus eliminated, competition for available sources of supply is avoided, and larger and more competent engineering and maintenance forces may be supported. Operation of large works, also, is much less costly per unit of output than is that of small. By such action many communities, too small individually to provide water systems, may secure service.

Water supply and distribution should be considered, generally, as a regional problem, rather than as one restricted to political boundaries. Comprehensive water systems may result from the formation of so-called "water districts", the organization and activities of water companies, or the extension of a municipality's water pipes, under special agreement for service, beyond the municipal boundaries.

Local conditions govern the comparative desirability of regional water service control, whether it shall be under water district administration, private management, or through extra-territorial expansion of a municipal system Water districts are not usually easy to organize because citizens do not react favorably to anything which savors of additional tax burden or benefit assessment; although the cost of installation and operation of the service generally is lower than it would be under any other arrangement. They resent, also, the delegation of authority to any except county commissioners, who ordinarily do not interest themselves in such matters as water supply and distribution, or to mayors and councils, although the powers vested in water district boards are no more sumptuary than those granted without question to municipal authorities, and no greater than necessary for the proper administration of a water system. Obsessed by the fear of economic burden and administrative oppression, either of which seldom materialize, many communities continue to exist either without the benefits of public water service or with inadequate service rather than combine with neighboring communities in the formation of a water district. Therefore, it often happens that the organization of a water company, which would operate without the imposition of taxes and benefit assessments except for fire protection, would result in service to an area of composite political administration much more quickly than if steps were taken to form a water district; and perhaps popular satisfaction would be as great, although the rates might prove even higher than total costs under public management.

Municipalities and unincorporated communities situated in the vicinity of a larger city or town and served by its supply and distribution system are relieved of the difficulties of system installation and operation, but their citizens labor under the disadvantages of outside control, and service ordinarily costs more than within the boundaries of the municipality providing the system.

Water districts have their origin either in general state legislation or under special legislative charter. An increasing number of

states have enacted laws governing the establishment and operation of water districts and allowing their formation whenever and wherever localities determine to do so. In other states special legislative action is necessary for the organization of water districts. Sewer districts are subject to the same methods of establishment, and often water and sewer districts have the same territorial limits and administrative body.

General legislative sanction for the organization and government of both water and sewer districts greatly facilitates their formation and increases their frequency, but special charters are often desirable to cover individual needs unless the general acts have been well considered and are exceptionally comprehensive.

In spite of the lack of general enabling acts relating to the establishment of water and sewer districts in Maryland, three notable districts of this type exist. Their presence, made possible only after exercise of the greatest perseverance, has resulted in widely extended water and sewerage service in the suburban sections around Baltimore and Washington, and to a lesser extent near Annapolis. These facilities could not have been provided so extensively and economically under any other arrangement. Their existence has made possible and has greatly stimulated the remarkable growth in population and assessable basis in the suburban sections of the counties near Baltimore and Washington.

The enabling acts covering these districts—The Washington Suburban Sanitary District, The Baltimore County Metropolitan District, and The Anne Arundel County Sanitary District—are similar and even identical in many respects. All of these districts issue their own bonds for construction purposes and assess annual front-foot benefit charges along water and sewer lines to meet mainly or wholly the fixed charges on the bonds. The Washington Suburban Sanitary District covers the suburban sections of both Montgomery and Prince George's Counties. The Anne Arundel County Sanitary District is composed of several detached small districts in Anne Arundel County.

Many of the towns and unincorporated communities of Maryland would receive better and more economical water service, or could obtain service where it is now lacking, through joint publicly or privately owned systems.

The general establishment of comprehensive regional public water systems would not only greatly extend water service in populous communities, but would also provide desirable facilities for rural sections near the roads along which interconnecting lines were laid. In view of the advantages to be gained through the installation and extension of water systems covering areas without limitation of political boundaries, it is urged that the organization of water districts be facilitated by enactment of general permissive legislation pertaining thereto.

PRESENT AND FUTURE COMBINED USES OF WATER.

Maryland's fresh-water rivers and smaller streams supply, at present, for public water supplies, industries, and steam power station requirements, approximately 1,240,000,000 gallons of water per day. Reference to Appendix B, Table 11, discloses that, of this amount, 252,000,000 gallons per day are used for public water supply, 59,000,000 for industrial use, and 928,000,000 for steam power station use.

The total daily use from underground sources is slightly over 13,812,000 gallons per day, serving approximately 120,562 people on 87 supplies.

While it is possible to estimate that the requirements for public water supply purposes only will be in the neighborhood of 350,000,000 gallons per day in 1950, no reasonably approximate figures for industrial and steam power station water supplies can be given. Increased industrial development along Maryland's streams appears likely if stream flows are regulated so as to supply sufficient quantities of water at all times, and upon the expansion of industry as well as the growth of population depends the demand for power. We do know that many opportunities for increased production of hydroelectric power exist in this State. Some water power will be produced in connection with the future construction of impounding reservoirs for public water supply purposes. The whole question of interrelation of growth of population, industrial expansion, and power demand is so intricate and founded on so many hypothetical possibilities that forecasts of what the future will bring would be meaningless, particularly so in the absence of exhaustive inquiry. There is no reason to believe, however, that the total daily requirements in 1950 will drop below 1,500,000,000 gallons.

ALLOCATION OF SURFACE WATER RESOURCES.

With considerably more than a billion and a quarter gallons of water already being taken each day from the rivers and small streams of Maryland, and probably almost as much returned to them or to tide-water in the form of sewage, industrial waste, or condensing and cooling water, determination of the most favorable uses to which all of the streams may be put becomes an important public duty. The adjustment of future contention as to priority of use among competing public and private interests will consequently soon need attention.

The development of the surface water resources of Maryland, to keep pace fully with every possible demand as it appears, is unquestionably desirable; but developments should not be allowed which will interfere with the highest use of a given stream, nor with those localities or parties having naturally the greatest present or probable

future need for its water. We do not intend to convey the impression that, in the absence of local requirements, development of a stream, either by public or private interests, for more distant localities is not favored, but the local necessities should be first surveyed and evaluated.

All streams particularly adapted for public water supply purposes should be considered in the light of such possible use, first by nearby territory and secondly by that more remote, before interference with existing or future public water supply requirements is allowed by competing developments; and for public water supply purposes each available stream ought to be allocated to the area it would most naturally serve, to the extent of that section's probable future demand, before permitting its use by more distant communities. The Savage River, for instance, would prove most useful for water supply in the Georges Creek Valley and Cumberland; the Patuxent River for supplying The Washington Suburban Sanitary District, outlying sections of Prince George's and Montgomery Counties, and large parts of Howard and Anne Arundel Counties; while the Patapsco River, Gunpowder Falls, Deer Creek and the Susquehanna naturally should serve Baltimore City and outlying sections to the north, west and east.

We believe it vital to the interests of the whole of Maryland to have future questions of priority of use, with respect to water supply and power resources, settled by a public board, the members of which shall be appointed and shall be qualified to make the required investigations and decisions.

STREAM REGULATING NECESSITY.

Excessive rainfalls, rapid melting of heavy snow covering and prolonged droughts result in extreme variations in stream flows, which cause floods in lowlands and silting of reservoirs on the one hand, and deficiency of water supply, lack of water for the dilution and oxidation of sewage, diminished water power output, and frequently difficulty with navigation on the other. Both extremes of high and low flow often produce conditions of water quality which prove troublesome to industrial water users and to operators of water purification works. Floods and droughts present, also, definite sanitary hazards.

With growing density of population and denudation of forests the extreme range between maximum and mimimum run-off, and likewise the damage done, has increased. Regulation of stream flow, for the purpose of eliminating excessively high and low water or minimizing the effects of their occurrence, has become, therefore, a problem of increasing importance generally and to many communities one almost of self-preservation.

METHODS OF REGULATING STREAM FLOW.

Both floods and extreme low water conditions may be effectively checked through the construction of adequate impounding reservoirs. Where reservoirs serve primarily for flood control the water level in them should be kept ordinarily at a low point in order that sufficient capacity may be held available for storing that proportion of excessive run-offs which cannot be accommodated within brief periods of time in down-stream channels without causing overflow. Low water in such reservoirs is maintained during dry and moderately wet weather by the regulation of discharge gates in the impounding dam. Reservoirs installed for controlling floods do not generally accomplish much in the maintenance of stream flow during droughts because the water in them falls to a low stage during those periods.

Where stream flows during dry weather do not suffice for public and industrial water supply or water power requirements, for dilution of sewage or industrial wastes, or for navigation, the construction of impounding reservoirs, in which the water level is kept as high as possible, and from which such quantities of water are drawn as will meet the daily dry weather demands, proves necessary. Such reservoirs, as well as reservoirs built for public water supply purposes, do reduce peak flood discharge to a considerable extent even though full at times of flood.

The construction of waste-ways and channel walls, the straightening of stream channels, and the filling of low ground may lessen flood damage in restricted areas, but they do not reduce the magnitude of run-off. Dredging is only of temporary value, especially where streams transport considerable quantities of silt. Forestation proves valuable in lowering flood peaks and minimizing soil erosion.

VARIATION OF FLOW IN MARYLAND STREAMS.

One has only to consider the wide range of flow constantly occurring in Maryland's streams to realize that the water resources of the State are developed and regulated to only a slight extent. The Patuxent River, Seneca Creek, Northwest Branch of the Anacostia River, Gunpowder Falls and the Potomac, Patapsco, Susquehanna and Monocacy Rivers are representative of Maryland's streams. Their run-offs are shown in Appendix B, Table 12.

The data there given form the basis for the figures in Table 13, Appendix B, which serve to emphasize the extreme range of flow caused by variable weather conditions. These figures show that the maximum run-off of the streams under consideration is from 19 to 79 times the average, and from 287 to more than 4,000 times the minimum. The smallest variation occurs on the Susquehanna River and the greatest on Northwest Branch, a small stream. The minimum run-offs, also, are only from 1.6 to 6.5 percent of the average;

and even the average run-offs for the month of minimum flow range from only 3.6 to 9.9 percent of the average over the periods of record. The record for Seneca Creek at Dawsonville, beginning in September, 1930, is of too short duration to be representative of anything except conditions in a very dry period.

With such marked extremes of run-off as Maryland's streams exhibit, no surprise should be aroused in contemplating the difficulties caused by both high and low water. The recent severe drought, especially, has brought clearly to the front the necessity of a general scheme of stream regulation in this State, in order that adequate water supply may be assured for both municipal and industrial purposes, and that sewage and industrial wastes may be disposed of properly with reasonable economy.

Upon the basis of available records it appears that most of our streams do not have as large average run-offs per square mile of watershed as do those of some states, but practically all of them, where substantial measures are possible, are capable of yielding, nevertheless, as much as 400,000 or 500,000 gallons per square mile per 24 hours all of the time instead of being dependable for from 10,000 to 50,000 gallons per square mile per 24 hours or slightly more as they are now during droughts. From some of them a regulated flow of more than half a million gallons daily per square mile may be obtained without disproportionate expense. Naturally the practicability and cost of raising substantially the minimum flow of a stream depend mostly upon the presence of favorable sites for impounding reservoirs, and to a much smaller degree upon the opportunities presented for increasing the amount of forest or brush cover on the watershed.

QUANTITY OF SEWAGE.

Approximately 193,000,000 gallons of sewage, with more than half of it untreated, are discharged daily into Chesapeake Bay and its tributary streams from a population of approximately 1,613,000 in the District of Columbia and the cities and towns of Maryland (together with a few in Delaware), as shown by Appendix B, Table 2, prepared by the Maryland State Department of Health. Of this quantity, about 68,000,000 gallons, originating from a population of approximately of 875,000, find outlet directly into Chesapeake Bay and tributary salt water arms, while 125,000,000 gallons, from a population of 738,000, are discharged into fresh water streams. The Potomac River and its tributaries receive most of the last-named quantity. Moreover, the Susquehanna River receives large contributions of sewage and industrial wastes from cities and towns in Pennsylvania and New York. The Potomac and its tributaries provide outlets for considerable quantities of these materials from communities in Pennsylvania, Virginia, and West Virginia, as well as for wastes from Maryland industries.

NECESSITY FOR STREAM REGULATION IN MARYLAND.

Except for a few impounding reservoirs built for municipal water supply, and still fewer for substantially increasing water supply for hydraulic power purposes, practically no construction affecting regulated stream flows has been accomplished in Maryland. Natural lakes and ponds do not exist. The following examples illustrate the need of adopting flow regulating measures in connection with at least a few of the more important streams; others might be cited with particular reference to the increase of municipal water supplies and the elimination of nuisance caused by the discharge of sewage.

Susqeuhanna River. Retention of water above the Conowingo dam coupled with extremely low stream flows during the drought of 1930-1931 caused such high salinity of the river water below that Havre de Grace was compelled to give up temporarily its public water supply obtained from the Susquehanna. Perry Point, for the same reason, abandoned the use of river water and developed new supply works on Mill Creek a small stream adjoining the reservation.

Other communities may desire to obtain public water supplies from the Susquehanna in the future and industrial plants may locate on its banks where excellent rail, water and electric power facilities exist. While better sources of water supply for the near-by towns are available, and the City of Baltimore, if and when it does take water from the Susqeuhanna, should be able to secure it from the Conowingo reservoir rather than from the much lower level below, nevertheless from the industrial standpoint, if from no other, the influence of brackish water from the Chesapeake Bay during dry periods should be reduced to the minimum. The City of Baltimore has protected itself in the above respect by the terms of an agreement formulated on March 26, 1925, with the company which developed the Conowingo project. This memorandum was filed with the Public Service Commission of Maryland before the permit for the project was granted.

Potomac River. Regulation of the Potomac's run-off is essential from the standpoints of municipal and industrial water supply and also the elimination of flood damage. The question of navigation above Georgetown has been brought into the picture, in addition, through studies made by the War Department.

Washington and Hagerstown use the Potomac River for public water supply, and this stream is an important factor in supporting industrial enterprise at and above Cumberland. During droughts the Potomac water becomes so hard as to cause inconvenience and extra expense to Hagerstown and Washington consumers. If Washington were an industrial city the condition would be intolerable.

Difficulty has been experienced by the industrial plants in obtaining sufficient and proper water to carry on their operations and in effecting satisfactory disposal of wastes. Conditions would have been even more serious during the recent drought had it not been possible for the West Virginia Pulp and Paper Company to let down water from its Stony River reservoir. An unofficial body, the Upper Potomac River Board, consisting of representatives from the State Department of Health, the City of Cumberland, and the industries, has under consideration the problems arising from the lack of regulation of the Potomac River.

The flood control situation at Cumberland needs attention. During the spring of 1924 two serious floods occurred at Cumberland, the first one proving the most destructive in the city's history. Corrective measures were recommended in a report submitted to the city by J. H. Kimball, consulting engineer. The principal item in the proposed project was the diversion of the Potomac River through a large cut-off channel in West Virginia, opposite the city. Up to the present time this waterway has not materialized.

Patapsco River. A number of industrial and power enterprises make rather extensive use of the Patapsco River. With the entrance of Baltimore City into the field as a prospective consumer of this river's water, lower riparian interests, as well as sewage disposal facilities which the stream might afford, will suffer unless a judiciously regulated flow is maintained.

Patuxent Rivers and Seneca Creek. The waters of the Patuxent, Middle and Little Patuxent Rivers, and Seneca Creek, if impounded according to a comprehensive scheme, would provide an economical and soft water supply for nearly 2,000,000 people. Such a project has been thoroughly studied by the Washington Suburban Sanitary Commission and considered by it as the most favorable one for the future water supply of the Washington Suburban Sanitary District, adjacent rapidly growing territory in Maryland, and outlying areas to the northeast, east and southeast, as far as Elkridge and Annapolis.

Antietam Creek. For some distance below the outfall from Hagerstown's sewage treatment works the presence of a number of small mill and power dams has occasioned offensive conditions in Antietam Creek, especially at times of warm weather and low run-off. Hagerstown has considered the purchase and removal of some of these dams and mill-ponds with the idea of improving the situation. Possibly the expenditure of additional funds in the better preparation of the city's sewage before discharge would effect an improvement and at the same time preserve what are usually considered as desirable features of the country-side.

Rock Creek. Rock Creek, a comparatively small stream discharging into the Potomac River at Washington, traverses, throughout its course in the District of Columbia, one of the finest public parks in the country. For a long distance above the Maryland-District of Columbia boundary the area adjoining Rock Creek is being, or is about to be developed as park land by a Maryland commission. A better regulated and sustained flow of water would greatly increase the value of this stream for recreational purposes.

Northwest Branch. The future park system of the Maryland suburbs of Washington will extend along Northwest Branch, a tributary of the Anacostia River. Northwest Branch, in addition, is the present source of water supply for the 65,000 residents of the Washington Suburban Sanitary District. Its further development for this purpose is contemplated.

Lack of an impounding reservoir on Northwest Branch cost the Washington Suburban Sanitary District more than an extra $100,000 in 1930 and 1931 when the stream practically dried up for extended periods and water had to be purchased from Washington at a figure much higher than that for which it might have been produced by the Commission's own plant.

Damaging floods periodically occur in and near Bladensburg, situated at and below the confluence of Northwest and Northeast Branches of the Anacostia River. Travel on the Baltimore-Washington Boulevard and on the Washington-Annapolis Road ceases in Bladensburg at such times. Houses are flooded and unhealthful conditions result.

Residents of Bladensburg are demanding that a real effort be made to eliminate flooding of the Anacostia River. Flood control on this stream can be accomplished only after a competent study and as a result of large expenditure. Some attention to the problem has been given by the War Department.

STREAM MEASUREMENT.

None of the undertakings so far discussed in this report or likely to result from the establishment of future policies of a comprehensive nature, can be developed without an exact and continuous knowledge of the quantitative aspects of the precipitation or rainfall, and of the resulting discharges of surface and underground streams. Until comparatively recently the State of Maryland has been unusually delinquent in accumulating information on these matters. Rainfall measurements on approximately 12,296 square miles of the State (somewhat over 9,000 of it in land area) have not been as carefully continued and expanded as would appear to be desirable.

The total catchment area of streams rising in or entering Maryland amounts to more than 50,000 square miles or approximately five times the total land area of the State of Maryland. The water flowing into

and arising in the State of Maryland is one of the most important life-giving sources of permanent wealth available. Exact determination of its amount should be one of the permanent duties of the State to be continued without interruption and forever.

Maryland has a moderately well distributed series of stations for rainfall recording, with records ranging from four to over one hundred and fifteen years. The United States Government is able to maintain only a few stations within each State for the measurement of rainfall. The greater part of the information must be provided, therefore, through State action and the Commission strongly recommends that ample funds be provided for the continuation of rainfall stations now under the supervision of the State Weather Service.

The direct gaging of streams in Maryland has been conducted in a haphazard fashion on account of the lack of funds and in the absence of any agency directly charged with this responsibility. The Maryland Geological Survey has been doing a little work in this field by cooperation with the Federal agencies, by means of small sums available from its appropriations or of contributions from towns and industries in urgent need of stream gaging data. As a matter of fact, private and local municipal agencies have contributed more money in recent years to Maryland stream gaging than has the State. One of the important examples of this fact is the contribution of the constituent groups in the Upper Potomac River Board, which exceed in this limited area the total annual State appropriation for stream gaging in the entire State. In general, the length of recording at any station has been too short to give all the data necessary and desirable for major projects. Although gages have been established at over thirty stations as indicated in Table 10, Appendix B, only five of these, namely at Point of Rocks, Frederick, Burtonsville, Woodstock and Loch Raven have continuous records for more than ten years and only three for thirty years. The long-term cyclical variations in stream flow make the use of stream gaging records of less than thirty years highly unsatisfactory for the diagnosis of the probable future behavior of the stream.

Any system of stream regulation and water allocation is dependent upon the primary accounting by long term gaging of the potentialities of the stream. No private industry of such magnitude would be expected to function without continuous bookkeeping. This bookkeeping the State now largely lacks.

PRESENT ADMINISTRATIVE CONTROL OVER WATER RESOURCES.

The State of Maryland has never passed any laws setting up administrative control of its water resources. It has created a Commission to enforce laws for the conservation of food supplies taken from waters—oysters, crabs, fish, etc.—but the use of the waters

remains practically uncontrolled. Such jurisdiction as the Public Service Commission may have is only incidental to its authority over the rates and methods of public utilities, and this jurisdiction —indefinite though it is—does not extend to the use of water by individuals and private companies. And it has been demonstrated, in the case of the acquisition of the waters of the Susquehanna River by a power company, that the Public Service Commission, even as to utilities, has not been vested with any adequate authority to determine upon a policy that would preserve the waters of the State for those uses of greatest importance to the people.

The State Board of Health is the only State body with any general powers over the uses of water, but its authority is limited to those matters which affect the public health. It has been given control over all programs for enlarging or altering existing water supply systems, and the construction of new systems, and similar authority with respect to sewerage systems and disposal plants. It has complete powers over such uses of water as involve problems of sanitation, or which may affect the purity of water, but it lacks any authority whatever, so long as the public health is not involved, in the uses of the waters of the State or the structures which may be erected in streams.

The General Assembly has set up the machinery for the establishment of local drainage districts, along the lines which have been adopted elsewhere, but these laws do not seem to be of any special State concern, and appear to have been availed of but rarely in Maryland.

PRESENT ADMINISTRATIVE CONTROL OVER WATER SUPPLY STRUCTURES.

The use of a stream, whether for increasing water supply or power facilities, for flood control or for other purposes, requires the construction of dams and necessary appurtenances. The frequency of installation of dams undoubtedly will greatly increase in Maryland. At present there are 47 dams on streams in Maryland and 39 in streams draining into Maryland. Such structures, unless well designed and constructed, and unless placed at proper locations and on safe foundations, prove a menace to life and property. From time to time failures of such structures have occurred and great destruction of life and property has followed. The failure of dams in Pennsylvania, Texas, California and West Virginia are historic evidences of the folly of not safeguarding such structures against defects by their careful review in advance of and during construction.

The failure of the St. Francis Dam in Southern California several years ago has brought to mind once more the necessity for some form of state control over such structures. The wisdom of such a policy is summarized in the verdict filed by the jury drawn by the coroner

of Los Angeles County to consider the testimony on the St. Francis Dam failure. The jury there stated: "The construction and operation of a great dam should never be left to the sole judgment of one man, no matter how eminent."

Legislation on this matter has been in force in the States of Colorado, Idaho, Massachusetts, New Jersey, New York, Pennsylvania, Washington, West Virginia, Vermont and others. Their details are shown in Appendix D. Practically every foreign country has established similar governmental agencies for such control.

In the light of the knowledge that 33 failures of dams have been recorded in the State of Pennsylvania; 26 in California; 24 in Colorado; 25 in New York State; 11 in Connecticut; 13 in Massachusetts; 12 in Missouri; 7 in Ohio; 6 in each of the states of Michigan, Minnesota and Texas; 5 in each of the states of New Mexico, South Carolina, Arizona and Utah; 4 in each of the states of Montana, New Hampshire, New Jersey, Rhode Island, South Carolina and Maine; 3 in each of the states of Georgia, Oregon and Tennessee; and a total of 30 in all other states; it is the conservative judgment of this Commission that every such structure should have some minimum degree of official review and supervision for the subsequent protection of life and property.

Every dam, regardless of its size, is in some degree a potential menace to everything below it. Nothing is so destructive, so uncontrollable and so deadly as a large volume of water suddenly released from its container. The Commission does not intend to indicate that the number of failures of such engineering structures exceeds relatively those occurring in other types of construction. The nature and location of dams, however, put them in a class where the jeopardy of life and property is very much increased over other structures. This conclusion is fortified by the fact that in the last 130 years, over 250 reported partial or complete failures of dams have occurred in the United States.

Although Maryland so far has been fortunate, it has had several warnings of possible disaster by the collapse of the foundation of the Stony River Dam and of the Camp Ritchie Dam. The Stony River Dam, owned by the West Virginia Pulp and Paper Company and located at Dobbin, West Virginia, on a tributary of the Potomac River, failed on January 15, 1914. The dam is a hollow concrete structure of the Ambursen type, 1,065 feet long, including the earth abutments, and with a maximum height of 51 feet. The drainage basin above the dam is about 12 square miles, the area of the reservoir when full is 480 acres, and the storage is 3,000,000,000 gallons.

The collapse of the dam was caused directly by water which found its way under the cutoff wall, which had not been sunk to a sufficient depth to form an adequate seal. This water, flowing below the base of the structure, scoured out the material upon which the dam rested and formed a huge cavity. The unsupported section then broke and

fell, allowing the water stored behind it to rush through, tossing huge fragments of shattered concrete downstream.

The dam was located in a wild, unsettled region, so that the wall of water which passed through the breach and surged onward down the valley to the Potomac River took no toll in human lives, although the flood completely demoralized traffic on the Western Maryland Railway and caused a panic among the inhabitants of the towns of Schell, Luke and Piedmont, many of whom, as the stage of the water rose, fled into the hills to reach points of safety.

The force of the flood had dissipated itself to a large extent in its nineteen mile journey from the dam to the nearest habitations. The damage was confined principally to the dam itself.

The Camp Ritchie Dam is located at the north end of Lake Royer just above the embankment of the Western Maryland Railway and the State road extending from Cascade to Pen Mar Park. It failed on the night of June 18, 1929.

The dam is of the earth fill type approximately 410 feet long, with a concrete spillway section 50 feet long, with a maximum height of 26 feet. The dam impounds 37,200,000 gallons of water. The area of the water surface in the lake is 19 acres. The width of the earth embankments on either side of the concrete spillway section varies at the top from 15 to 20 feet. The water face of the dam has a slope of approximately 4:1 and the downstream face has a slope of 2:1.

No cutoff walls were provided in the east embankment; the west embankment, however, had two cutoffs, as indicated by test holes dug after the dam failed. The spillway section was built on sheet piling driven to refusal.

The failure occurred in the east embankment, where no cutoff existed. For several days before the failure, a small leak was noted in the embankment around the east abutment of the concrete spillway section, which gradually increased. On the day previous to the failure, it was noted that the water coming through the leak was turbid, indicating that the material in the embankment was being washed out. The structure failed the night of June 18, 1929, and did considerable damage to the State road just below, besides washing away a number of outbuildings and doing some damage to chicken coops and pig pens in Rouzerville, Pennsylvania, which is located about two miles below the dam on Red Falls Creek. There was no loss of life.

No agency exists in the State of Maryland to which the task is delegated of reviewing the design and supervising the construction of dams. A dam of any size, impounding any quantity of water and located at any point in the State, may be constructed now with only superficial review of its design and of its underlying foundation, incidental to other matters involved in the project. The State Board of Health makes some effort to check the structural acceptability of dams, where they are parts of domestic water supply projects. Its

review is limited to a general check, because of the absence of necessary technical forces and funds to supervise these undertakings in detail. Dams which are parts of other projects of a power or industrial nature have no governmental review.

This situation is well exemplified in the construction in 1931 of the new Koon Dam for the City of Cumberland. This dam was constructed as a part of the extension of the public water supply facilities for Cumberland. It is situated, however, in the State of Pennsylvania. Its design and construction were rigidly reviewed by a governmental agency currently at work in the State of Pennsylvania. The collapse of the Koon Dam would endanger for the most part property and life wholly within the State of Maryland. If the dam had been built a short distance below its present site, in Maryland rather than in Pennsylvania, the review of its design and construction by any State agency would have been of quite superficial character.

The Commission feels that this deficiency of State control over important water supply structures of this nature, should be corrected in the immediate future.

REGULATORY PROCEDURES IN OTHER STATES.

Maryland must be grouped with about a dozen other states where control of water resources and structures is practically non-existent, or where the movement to exert the State's authority on the subject is just beginning. In that group are found Alabama, Delaware, Georgia, Florida, Louisiana, Mississippi, Arkansas, Kentucky, Illinois and Indiana. The New England States of Connecticut, New Hampshire and Vermont have also fallen far behind the great majority of states in the adoption of measures affecting the use of water, but these three states have enacted legislation designed to safeguard the public in the construction and maintenance of dams and other water structures.

California, by what it has done in recent years, and by what it is planning to do in the near future, belongs in the front rank of those states which are benefiting by intelligent and progressive methods in the use of water and the character of water structures. It has several codes, embodying regulations on different phases of water problems, and it has but lately (1931) created a Water Conservation Commission to survey all resources, and to formulate a complete program. It has a State Water Commission with licensing powers, to insure an equitable distribution of State waters, and it has vested other authority in the Department of Public Works and the Department of Finance. California has legislation authorizing the formation of conservancy districts, for local control over the uses of water. Through these agencies, as well as those of water districts, and the State Reclamation Board, important steps have been taken in respect to flood control, the regulation of ditches, streams, canals and reser-

voirs, forestation, irrigation and reclamation. The matter of adequate regulation of water for power purposes is awaiting action by a Water Resources Commission of wide jurisdiction. California has had, since 1929, the most complete and effective code of laws in the country relating to dams and other water structures. The lesson of the collapse of St. Francis dam, and other lesser failures, has not been lost so far as California is concerned.

Colorado has given a great deal of attention to measures regulating the use of water, although much of them are local in scope. The State is now working toward greater centralization of control. State-wide jurisdiction as to construction, and as to some other phases of water problems is vested in the State Engineer. There are seventy water districts, managed by Water Commissioners, and also by a division engineer appointed by the Governor. The distribution of water stored in State reservoirs is managed by a Board of Land Commissioners. There are provisions for Water Works Districts, Internal Improvement Districts and Drainage Districts. There is also a State Irrigation District Commission. The State Engineer was ordered in 1929 to make a complete survey of all water resources of the State, and a number of commissions have been created to negotiate compacts with adjoining states for the use of interstate waterways. Plans for the construction of dams and reservoirs are subject to the approval of the State Engineer.

Idaho has given state-wide jurisdiction over the use of water resources and the construction of dams and other water works to the Department of Reclamation. This department has licensing powers as to the proper distribution of water, and authority over irrigation and drainage districts. Its consent is necessary before water may be used for power purposes, and no dam more than ten feet in height may be erected without its approval of the plans. The Department may also order repairs to existing dams. Idaho's legislation is in accordance with the general outlines of the regulations in force in other mid-western and western states, such as Nevada, Oregon, Utah and Washington. In most of these states there are conservancy districts of various characters, irrigation, reclamation and drainage districts, and other such sub-divisions looking toward the control of waters. A study of the history of the laws in these states discloses a tendency to centralize authority, and, in recent years, to grant wider powers to officials and departments over the use of waters, the allocation of uses, with special consideration of power projects and the construction and maintenance of water works. Oregon may be singled out as one of the states which has made the greatest progress, especially in developing effective control over water power development.

In the East, the states of New York, Pennsylvania and New Jersey are among those which have given evidence of understanding the seriousness of the problems involved, and their paramount importance to the welfare of the people. New York has developed a

water conservation program, and has taken steps to put it into effect. It created a special commission to investigate all water resources problems of the State, including the development of the St. Lawrence River, and to devise plans for the solution of those problems. The State Conservation Department is divided into five departments, one of which is the division of Water Power and Control, headed by the Commission of Water Power and Control. This commission has broad powers over the use of waters for all purposes, including power, and is itself authorized to engage in projects for developing the water resources of the State. It has general supervisory authority over construction whether by private parties or by the political subdivisions of the State, and its license is a condition precedent to water-works projects. It has jurisdiction over all water supplies, actual or proposed, of municipalities. Legislation provides for the creation of Union Water Districts, Drainage Improvement Districts, Town Water Systems and Joint Water Districts. New Jersey has a State Water Policy Commission, with power to conserve, regulate and control all water and water works of the State. It investigates and has authority to act with respect to water sources, waste problems, flood control and navigation, and public water supplies. New Jersey is divided into two water supply districts, and these districts are further divided into sub-districts. There are also local commissions on water structures, and a State commission on flood control and drainage. Pennsylvania has been experimenting for many years with different forms of regulation over water resources and uses and structures. Jurisdiction, local and State, has been imposed in various officials, departments, boards and commissions over various phases of water problems. In recent years the tendency has been to centralize authority in the Water and Power Resources Board, in the Department of Forests and Waters, and that Board is now functioning in accordance with the best modern practices.

In practically all of the states in which important progress has been made in the control of waters, both surface and sub-surface, bodies such as the Public Service Commission have been given authority to grant permits and to fix rates, etc., and power to compel the observance of measures designed to safeguard the purity of drinking water has been vested in health officers.

The studies made in New York, New Jersey and Pennsylvania of the future needs of their people have resulted, in each case, in special attention to the sources of water supplies, and consideration of the means by which they may be preserved for those who will need them in the years to come. All of these states have found their way into the Supreme Court of the United States, battling to protect their precious possessions. Mr. Justice Holmes, in one of the cases involving the conflicting claims of New Jersey, New York and Pennsylvania for water rights, declared that "a river is more than an amenity, it is a treasure." Some states, careless of their rights, have been idle

while usages detrimental to the whole people have been introduced and given a permanent status. Those jealous of their assets have protected them, while others are losing treasures which cannot be replaced.

DEFICIENCIES IN THE POLICY AND PROGRAM OF THE STATE OF MARYLAND WITH RESPECT TO WATER RESOURCES.

Measurement. As already pointed out in more detail, the State of Maryland has had virtually no policy in the bookkeeping of its water resources. The number of gaging stations, the length of term of such records, and the policy of location of stations have all been characterized by neither consistency nor plan. The data which result from the measurement of streams, if of a continuous and carefully selected nature, are invaluable assets to the people of the State. No great amount of annual expenditure would be necessary for the improvement of this situation. A permanent policy, a program and an administrative agency, however, are essential prerequisites to an intelligent plan of water measurement. Without them any policy for the development and conservation of water resources is impossible.

Allocation of Water Resources. It is one of the axioms of history that the greatest civilizations have developed and thrived where people made the most efficient and intelligent uses of the water supplies available to them. The availability of waters has been even less significant than the uses to which the available sources are put. One of the most striking demonstrations of this axiom is presented by the transformation of the desert wastes of Southern California into a populated and rich territory.

The State of Maryland has no plan either for the conservation or the development of its water resources, from the standpoint of public or private use. It has no agency for determining or recording existing rights, for the granting of new rights, for the beneficial use of the State's waters or for the protection of recorded rights to the use of public waters by regulating diversions from them. In other words, the State has nothing to say in the development of water supplies either as to priority, purpose, period, place or quantity of uses. Whether waters of the State are used in accordance with the underlying principle of public benefit is largely determined by chance, without the intelligent supervision of any State agency. Increasing competition for water is already beginning to appear. No time more opportune than the present will appear for the State to assume its neglected task of control.

The evidence accumulated by the Commission and presented briefly in this report, indicates that Maryland should establish a well-defined policy of water resources control or allocation, for the following reasons:

(a) Questions of ownership as between states are beginning to arise.

(b) The rights of the Federal Government and their probable effect upon plans for developing water resources within the State are matters of considerable concern to many of the eastern states.

(c) Some official thought should be given to the determination of the character of water uses and their relative importance in the different areas of the State. Competition for water by public and by private groups has already been pointed out. The interests of both can be safeguarded by an intelligent program. The interests of neither are protected on account of the absence of any plan.

(d) A careful determination of the extent, nature and occurrence of water supply cycles is required for the near future, if the water supplies of the State are to be planned with intelligence.

(e) A continuing comprehensive survey of the major demands of the various sources of supply should be provided for.

(f) The determination of the economy of a correlation of uses, with effective stream regulation, is a matter of immediate necessity. Problems of stream regulation in the upper reaches of the waters of the Potomac, of re-use of the waters for industrial purposes, of the sanitary requirements, and of the navigation, consumptive and non-consumptive uses of waters should be the concern of a parent governmental agency.

(g) Some adequate means for ascertaining relative ownership and priority of uses as between individuals, municipalities, corporations and so on, should be established.

(h) Agencies for administering these relative rights of use, for accounting and for recording and publishing data as to these water resources, should be established.

Structures. At the present time no agency exists in the State of Maryland with the delegated duty of inspecting existing dams; approving plans and specifications and inspecting the construction of new dams, of the enlargement, alteration, repair and removal of old dams; and supervising, maintaining and operating all dams in so far as it is necessary to safeguard life and property. The Commission has inventoried the total number of dams of any appreciable size in Maryland. The list is shown on the map attached to this report in Appendix C as well as in Appendix B, Tables 4, 6 and 9.

RECOMMENDATIONS AS TO PROGRAM AND NECESSARY LEGISLATION.

It should appear, from what has already been said, that the forecasting and planning for future uses of the water supplies of the State of Maryland are duties which the State of Maryland cannot afford to ignore. The formulation of policy is, however, one which should be approached with caution, since only broad general principles can be laid down in advance of the requirements which future growth and development of the State might disclose. The Commission is fully aware of the danger of attempting to fix details of policy in the preliminary stages of development. It is equally impressed, however, with the necessity for constructive planning for future development. When properly controlled, regulated and applied to the requirements of the public, water is one of the most useful allies in enriching the potentialities of the State. Aside from its primary use for drinking purposes, it is one of the most essential agents as a purification device for wastes, it provides power and transportation, it serves as a useful developer of productive soils and it offers great opportunities for industrial use. The Commission does not feel that its uncontrolled use should be left to chance for the future.

Necessary safeguards for the people of the State can be provided through a relatively simple proposal. This proposal the Commission makes as its only recommendation, in the following terms:

The Commission recommends the creation of a permanent Water Resources Commission of Maryland, with general powers to formulate a water conservation policy, to control the priority, purpose, period, place and quantity of use of water, and to provide for continuity of stream gauging and for the supervision of dams.

A proposed legislative act embodying these general principles of State action is included in this report.

The passage of these basic codes of law will do much to conserve and develop the rich water assets of the State, by substituting plan for haphazard competition. They will provide for future generations a heritage of useful water supply, essential for the growth of the State. Without them, costly, reckless and unnecessary projects and structures will be developed. The State has an obligation to avoid these predictable contingencies and should assume it.

ACKNOWLEDGMENTS.

The Commission takes this opportunity of acknowledging the unstinted co-operation accorded it by the personnel of the State Department of Health of Maryland, the Maryland Geological Survey, the Public Service Commission of Maryland, the United States Geo-

logical Survey and the officials of Pennsylvania, Virginia, West Virginia, and of other states too numerous to be listed. All of these agencies supplied the Commission with unlimited information, suggestion and advice of great value in its deliberations.

It acknowledges, furthermore, the active co-operation of George Laird Hall, who acted as Secretary to the Commission during its operations.

Respectfully submitted,

ABEL WOLMAN, *Chairman*,

FRANCIS H. DRYDEN,

THOMAS W. KOON,

EDWARD B. MATHEWS,

RICHARD MOMMERS,

ROBERT B. MORSE,

PHILIP B. PERLMAN.

APPENDIX A

INVENTORY OF STREAMS IN MARYLAND.

Gazetteer and Drainage Areas of Streams.

The area of the State of Maryland is divided by prominent physical features into five main or primary drainage basins as follows: Ohio River, Potomac River, Chesapeake Bay exclusive of Potomac River, Atlantic Ocean exclusive of Delaware Bay, and Delaware Bay. Chesapeake Bay drainage is subdivided into East and West Chesapeake, the mouth of the Susquehanna being taken as the dividing point.

The data in the gazetteer are based on information obtained from the U. S. Geological Survey topographic maps of Maryland and surrounding States available in October, November, and December, 1931. The entire State of Maryland with the exception of 21.8 square miles south of latitude 38° 00′ and west of longitude 75° 37′ is on this date (January, 1932) covered by topographic maps, scale 1:62,500. The small area not included on topographic maps is shown on the Maryland-Virginia Hallwood quadrangle of the progressive military map compiled by the Corps of Engineers, U. S. Army, in 1919, scale 1:62,500. The corrections were made to the boundary between Maryland and Virginia along the Potomac River from the Jones Point Light to the mouth of the Potomac, as defined by Nelson and Mathews in the report on the location of the boundary line along the Potomac River between Virginia and Maryland, 1928.

The drainage areas of all streams in Maryland of approximately 15 square miles or more are given in the accompanying table as determined from topographic maps. The total area of the State of Maryland was determined to be 12,296 square miles. This value is considered to be the most accurate figure yet compiled of the total area of Maryland as the drainage-area determinations were made with extreme care and were carefully checked. The division of the State area among the five primary basins is as follows:

Basin	*Drainage Area (sq. mi.)*	*Per Cent of Total*
Ohio River	419	3.4
Potomac River	3,824	31.1
Chesapeake Bay	7,746	63.0
Delaware Bay	8	.1
Atlantic Ocean	299	2.4
Total	12,296	100.0

The streams in the accompanying table are arranged in alphabetical order irrespective of primary drainage basins. The following information is included in the table: The name of the stream and the point at which the drainage area is determined, the name of the county and State in which the stream rises, the stream to which it is tributary, the primary basin of which it is a part, the drainage area in square miles at the point described, and the drainage area within Maryland of those streams whose area extends outside of Maryland (shown in parentheses). In general the drainage area at the mouth of each stream is given and at State lines for those streams whose area extends beyond the State boundaries, at gaging stations and at other points considered useful.

There are over 200 streams whose drainage areas are given at the mouth and more than 300 drainage areas are listed in the table.

GAZETTEER AND DRAINAGE AREAS OF STREAMS

Name of Stream	Source	Tributary to	Primary Drainage	Drainage Area (Square Miles)*	
Alloway Creek at mouth	Adams County, Pa.	Monocacy River	Potomac	23.8	(6.1)
Alloway Creek at Pennsylvania State line	Adams County, Pa.	Monocacy River	Potomac	15.9 in Pa.	
Anacostia River at mouth	Montgomery County, Md.	Potomac River	Potomac	170	(145)
Anacostia River, Northeast Branch at mouth	Montgomery County, Md.	Anacostia River	Potomac	75.6	
Anacostia River, Northwest Branch at mouth	Montgomery County, Md.	Anacostia River	Potomac	53.2	(49.6)
Anacostia River, Northwest Branch, gaging station, Northwest Mills, Md.	Montgomery County, Md.	Anacostia River	Potomac	21.3	
Andover Branch at Delaware State line	Kent County, Del.	Chester River	East Chesapeake	9.6	(0.66)
Andover Branch at mouth	Kent County, Del.	Chester River	East Chesapeake	95.4	(54.1)
Antietam Creek at mouth	Adams County, Pa.	Potomac River	Potomac	292	(187)
Antietam Creek, gaging station, Burnside Bridge nr. Sharpsburg, Md.	Adams County, Pa.	Potomac River	Potomac	281	(176)
Atlantic Coast Drainage in Maryland (not including Delaware River)				299	
Aydelotte Branch at mouth	Wicomico County, Md.	Pocomoke River	East Chesapeake	18.1	
Back Creek at mouth	Somerset County, Md.	Manokin River	East Chesapeake	18.4	
Back River at head of estuary, half a mile south of Rosedale, Md.	Baltimore County, Md.	Chesapeake Bay	West Chesapeake	26.8	
Back River at mouth	Baltimore County, Md.	Chesapeake Bay	West Chesapeake	62.4	
Ballenger Creek at mouth	Frederick County, Md.	Monocacy River	Potomac	18.0	
Barren Creek at railroad crossing, Mardela Springs, Md.	Sussex County, Del.	Nanticoke River	East Chesapeake	23.4	(13.8)
Barren Creek at mouth	Sussex County, Del.	Nanticoke River	East Chesapeake	30.0	(20.3)
Battle Creek at mouth	Calvert County, Md.	Patuxent River	West Chesapeake	18.9	
Bear Branch at mouth	Carroll County, Md.	Big Pipe Creek	Potomac	14.5	
Bear Creek at mouth	Garrett County, Md.	Youghiogheny River	Ohio	50.5	
Beaver Creek at mouth	Washington County, Md.	Antietam Creek	Potomac	33.5	
Beaverdam Branch at mouth	Prince George's County, Md.	Anacostia River	Potomac	14.7	(14.6)
Beaverdam Creek at mouth	Prince George's County, Md.	Indian Creek	Potomac	13.7	
Beaverdam Run at mouth	Baltimore County, Md.	Western Run	West Chesapeake	21.2	
Beaver Run at mouth	Carroll County, Md.	No.Br.Patapsco River	West Chesapeake	16.2	
Bennett Creek at mouth	Montgomery County, Md.	Monocacy River	Potomac	66.1	
Big Elk Creek at mouth	Chester County, Pa.	Elk River	East Chesapeake	63.7	(21.3)
Big Elk Creek at Pennsylvania State line	Chester County, Pa.	Elk River	East Chesapeake	41.9	(1.00)
Big Piney Run at Pennsylvania State line	Garrett County, Md.	Casselman River	Ohio	23.6	(19.7)
Big Pipe Creek at mouth	Carroll County, Md.	Double Pipe Creek	Potomac	108	
Bird River at mouth	Baltimore County, Md.	Gunpowder River	West Chesapeake	26.7	

*Figures in parentheses indicate portion of drainage area in Maryland.

GAZETTEER AND DRAINAGE AREAS OF STREAMS

Name of Stream	Source	Tributary to	Primary Drainage	Drainage Area (Square Miles)*	
Bohemia River at mouth	Cecil County, Md.	Elk River	East Chesapeake	53.4	(44.9)
Braddock Run at mouth	Allegany County, Md.	Wills Creek	Potomac	17.5	
Broad Creek at mouth	Prince George's County, Md.	Potomac River	Potomac	30.0	
Broad Creek at Highway bridge below mouth of Hunters Mill Branch	Prince George's County, Md.	Potomac River	Potomac	23.6	
Broad Creek at mouth	Harford County, Md.	Susquehanna River	Chesapeake	41.4	(40.8)
Broad Run at mouth	Frederick County, Md.	Catoctin Creek	Potomac	16.0	
Broad Run at mouth	Montgomery County, Md.	Potomac River	Potomac	14.6	
Buffalo Run at mouth	Preston County, W. Va.	Youghiogheny River	Ohio	22.6	(17.6)
Bush Creek at mouth	Frederick County, Md.	Monocacy River	Potomac	33.7	
Bush River at mouth	Harford County, Md.	West Chesapeake Bay	West Chesapeake	140	
Bush River at head of estuary, 0.3 miles northwest of Sewell, Md.	Harford County, Md.	West Chesapeake Bay	West Chesapeake	35.7	
Bynum Run at mouth	Harford County, Md.	Bush River	West Chesapeake	23.8	
Cabin John Creek at mouth	Montgomery County, Md.	Potomac River	Potomac	25.6	
Carroll Creek at mouth	Frederick County, Md.	Monocacy River	Potomac	18.6	
Casselman River at Pennsylvania State line	Garrett County, Md.	Youghiogheny River	Ohio	68.7	(65.4)
Casselman River, North Branch at mouth	Garrett County, Md.	Casselman River	Ohio	25.2	
Casselman River, South Branch at mouth	Garrett County, Md.	Casselman River	Ohio	20.3	
Catocin Creek at mouth	Frederick County, Md.	Potomac River	Potomac	121	
Cattail Creek at mouth	Howard County, Md.	Patuxent River	West Chesapeake	28.5	
Chapel Branch at mouth	Caroline County, Md.	Choptank River	East Chesapeake	18.2	(11.2)
Chaptico Creek at head of estuary, 0.7 miles southwest of Chaptico, Md.	St. Mary's County, Md.	Wicomico River	Potomac	30.7	
Charles Branch at mouth	Prince George's County, Md.	West'n Br. (Patuxent)	West Chesapeake	17.6	
Cherry Creek at mouth	Garrett County, Md.	Youghiogheny River	Ohio	17.2	
Chesapeake Bay Drainage in Maryland (not including Potomac River)				7,746	
Chester River at mouth	Kent County, Del.	Chesapeake Bay	East Chesapeake	446	(405)
Christiana Creek in Maryland	Chester County, Pa.	Christiana River	Delaware	7.8	
Choptank River at Delaware State line crossing 1 mile below mouth of Tappahanna Ditch	Queen Anne's County, Md., and Kent County, Del.	Chesapeake Bay	East Chesapeake	29.1	(7.5)
Choptank River at highway crossing, Greensboro, Md.	Queen Anne's County, Md., and Kent County, Del.	Chesapeake Bay	East Chesapeake	138	(44.8)
Choptank River at mouth	Queen Anne's County, Md.	Chesapeake Bay	East Chesapeake	795	(692)

*Figures in parentheses indicate portion of drainage area in Maryland.

Name of Stream	Source	Tributary to	Primary Drainage	Drainage Area (Square Miles)*	
Choptank River below mouth of Tuckahoe Creek	Queen Anne's County, Md.	Chesapeake Bay	East Chesapeake	415	(312)
Collington Branch at mouth	Prince George's County, Md.	West'n Br. (Patuxent)	West Chesapeake	21.9	
Conococheague Creek, gaging station, Fairview, Md.	Adams County, Pa.	Potomac River	Potomac	495	(2.5)
Conococheague Creek at mouth	Adams County, Pa.	Potomac River	Potomac	563	(65.8)
Conococheague Creek at Pennsylvania State line	Adams County, Pa.	Potomac River	Potomac	491	(0.46)
Conowingo Creek at mouth	Lancaster County, Pa.	Susquehanna River	Chesapeake	38.6	(5.0)
Conowingo Creek at Pennsylvania State line	Lancaster County, Pa.	Susquehanna River	Chesapeake	33.9	(0.30)
Corsica River at mouth	Queen Anne's County, Md.	Chester River	East Chesapeake	36.3	
Crabtree Creek at mouth	Garrett County, Md.	Savage River	Potomac	29.1	
Curtis Creek at mouth	Anne Arundel County, Md.	Curtis Bay	West Chesapeake	35.7	
Cypress Branch at Delaware State line	New Castle County, Del.	Andover Branch	East Chesapeake	14.3	(0.05)
Cypress Branch at mouth	New Castle County, Del.	Andover Branch	East Chesapeake	35.0	(19.5)
Deep Creek at mouth	Garrett County, Md.	Youghiogheny River	Ohio	66.6	
Deep Run at mouth	Howard County, Md.	Patapsco River	West Chesapeake	19.9	
Deer Creek at mouth	York County, Pa.	Susquehanna River	Chesapeake	171	(145)
Deer Creek at Pennsylvania State line	York County, Pa.	Susquehanna River	Chesapeake	12.3	(0.10)
Deer Creek, gaging station at Rocks, Md.	York County, Pa.	Susquehanna River	Chesapeake	94.4	(69.2)
Delaware River Basin in Maryland				7.8	
Dividing Creek at mouth	Wicomico County, Md.	Pocomoke River	East Chesapeake	62.2	
Double Pipe Creek at mouth	Carroll County, Md.	Monocacy River	Potomac	192	
Dry Run at mouth	Allegany County, Md.	No. Br. Potomac River	Potomac	22.5	
Dry Seneca Creek at mouth	Montgomery County, Md.	Seneca Creek	Potomac	19.2	
East Fork (Langford Bay) at mouth	Kent County, Md.	Langford Bay	East Chesapeake	21.4	
Elk River at mouth	Cecil County, Md.	Chesapeake Bay	East Chesapeake	267	(187)
Evitts Creek, gaging station nr. Cumberland, Md.	Bedford County, Pa.	No. Br. Potomac	Potomac	89.0	(25.6)
Evitts Creek at mouth	Bedford County, Pa.	No. Br. Potomac	Potomac	94.0	(30.6)
Evitts Creek at Pennsylvania State line	Bedford County, Pa.	No. Br. Potomac	Potomac	54.3 in Pa.	
Fifteenmile Creek at mouth	Bedford County, Pa.	Potomac River	Potomac	61.2	(49.3)
Fifteenmile Creek at Pennsylvania State line	Bedford County, Pa.	Potomac River	Potomac	8.3 in Pa.	
Fishing Creek at mouth	Calvert County, Md.	Chesapeake Bay	West Chesapeake	17.9	
Fishing Creek at mouth	Frederick County, Md.	Monocacy River	Potomac	18.2	
Flintstone Creek at mouth	Bedford County, Pa.	Town Creek	Potomac	31.1	(6.1)
Forge Branch at mouth	Caroline County, Md.	Choptank River	East Chesapeake	18.5	
Friends Creek at mouth	Frederick County, Md.	Toms Creek	Potomac	13.5	(10.6)
Furnace Creek at mouth	Cecil County, Md.	Chesapeake Bay	East Chesapeake	21.0	
Furnace Creek at mouth	Anne Arundel County, Md.	Curtis Creek	West Chesapeake	13.5	
Georges Creek, gaging station at Franklin, Md.	Garrett County, Md.	No. Br. Potomac	Potomac	72.4	

*Figures in parentheses indicate portion of drainage area in Maryland.

GAZETTEER AND DRAINAGE AREAS OF STREAMS

Name of Stream	Source	Tributary to	Primary Drainage	Drainage Area (Square Miles)*	
Georges Creek at mouth	Garrett County, Md	No. Br. Potomac	Potomac	73.9	
Georges Run at mouth	Carroll County, Md	Gunpowder Falls	West Chesapeake.	20.9	
German Branch at mouth	Queen Anne's County, Md	Tuckahoe Creek	East Chesapeake..	24.0	
Gilbert Swamp at head of estuary, 1.8 miles south of Newport, Md	Charles County, Md	Wicomico River	Potomac	45.0	
Gillis Falls at mouth	Carroll County, Md	So. Br. Patapsco	West Chesapeake.	19.3	
Givvens Branch at mouth	Wicomico County, Md	Pocomoke River	East Chesapeake..	18.5	
Great Bohemia Creek at mouth	New Castle County, Del	Bohemia River	East Chesapeake..	20.6	(12.0)
Great Seneca Creek at mouth	Montgomery County, Md	Seneca Creek	Potomac	62.6	
Great Tonoloway Creek at mouth	Fulton County, Pa	Potomac River	Potomac	114	(2.08)
Green Run at mouth	Sussex County, Del	Pocomoke River	East Chesapeake..	14.7	(10.1)
Grove Creek at mouth	Washington County, Md	Antietam Creek	Potomac	25.0	
Gunpowder Falls at mouth	York County, Pa	Gunpowder River	West Chesapeake.	350	(339)
Gunpowder Falls at Pretty Boy Reservoir Dam	York County, Pa	Gunpowder River	West Chesapeake.	79.8	(72.9)
Gunpowder River at mouth	Baltimore County, Md	Chesapeake Bay	West Chesapeake.	472	(460)
Gwynns Falls at mouth	Baltimore County, Md	Patapsco River	West Chesapeake.	65.5	
Hall Creek at mouth	Anne Arundel County, Md	West'n Br. (Patuxent)	West Chesapeake.	20.0	
Hawlings River at mouth	Montgomery County, Md	Patuxent River	West Chesapeake.	28.4	
Henson Creek at mouth	Prince George's County, Md	Broad Creek	Potomac	18.2	
Hunting Creek at mouth	Caroline County, Md	Choptank River	East Chesapeake..	24.5	
Hunting Creek at mouth	Frederick County, Md	Monocacy River	Potomac	42.2	
Hunting Creek at mouth	Calvert County, Md	Patuxent River	West Chesapeake.	28.7	
Hunting Creek at highway crossing 2 miles southwest of Parran, Md	Calvert County, Md	Patuxent River	West Chesapeake.	15.6	
Indian Creek at mouth	Prince George's County, Md	Anacostia River	Potomac	29.1	
Indian Run at mouth	Baltimore County, Md	Western Run	West Chesapeake.	14.9	
Island Creek at mouth	Queen Anne's County, Md	Southeast Creek	East Chesapeake..	22.7	
Israel Creek at mouth	Frederick County, Md	Monocacy River	Potomac	33.2	
Israel Creek at mouth	Frederick County, Md	Potomac River	Potomac	13.1	
James Run at mouth	Harford County, Md	Bush River	West Chesapeake.	11.5	
Jennings Run at mouth	Somerset County, Pa	Wills Creek	Potomac	37.7	(28.7)
Jones Falls at mouth	Baltimore County, Md	Patapsco River	West Chesapeake.	59.0	
Kings Creek at mouth	Talbot County, Md	Choptank River	East Chesapeake..	21.1	
Kings Creek at mouth	Somerset County, Md	Manokin River	East Chesapeake..	18.6	
Laurel Run at mouth	Preston County, W. Va	Snowy Creek	Ohio	10.8	(0.83)
Licking Creek at mouth	Franklin County, Pa	Potomac River	Potomac	213	(27.6)

*Figures in parentheses indicate portion of drainage area in Maryland.

Name of Stream	Source	Tributary to	Primary Drainage	Drainage Area (Square Miles)*	
Licking Creek at lowest crossing of Pennsylvania State line	Franklin County, Pa.	Potomac River	Potomac	188	(3.23)
Licking Creek, gaging station nr. Sylvan, Pa.	Franklin County, Pa.	Potomac River	Potomac	158	(1)
Linganore Creek at mouth	Carroll County, Md.	Monocacy River	Potomac	88.4	
Linganore Creek, North Fork at mouth	Carroll County, Md.	Linganore Creek	Potomac	20.3	
Linganore Creek, South Fork at mouth	Carroll County, Md.	Linganore Creek	Potomac	19.7	
Little Antietam Creek at mouth	Washington County, Md.	Antietam Creek	Potomac	32.2	
Little Antietam Creek at Pennsylvania State line	Adams County, Pa.	Potomac River	Potomac	93.3	(7.4)
Little Bennett Creek at mouth	Montgomery County, Md.	Bennett Creek	Potomac	24.6	
Little Bohemia Creek at mouth	Cecil County, Md.	Bohemia River	East Chesapeake	14.3	
Little Catoctin Creek (lower) at mouth	Frederick County, Md.	Catoctin Creek	Potomac	13.0	
Little Conococheague Creek at mouth	Franklin County, Pa.	Potomac River	Potomac	18.0	(16.7)
Little Elk Creek at mouth	Chester County, Pa.	Elk River	East Chesapeake	41.9	(29.6)
Little Elk Creek at Pennsyvania State line	Chester County, Pa.	Elk River	East Chesapeake	13.1	(1.03)
Little Falls at mouth	York County, Pa.	Gunpowder Falls	West Chesapeake.	53.1	(49.0)
Little Gunpowder Falls at mouth	Baltimore and Harford Counties, Md.	Gunpowder River	West Chesapeake.	58.3	
Little Gunpowder Falls, gaging station at Laurel Brook, Md.	Baltimore and Harford Counties, Md.	Gunpowder River	West Chesapeake.	36.1	
Little Hunting Creek at mouth	Frederick County, Md.	Hunting Creek	Potomac	11.8	
Little Monocacy River at mouth	Montgomery County, Md.	Potomac River	Potomac	18.9	
Little Northeast Creek at mouth	Chester County, Pa.	Northeast River	East Chesapeake	18.7	(18.2)
Little Paint Branch at mouth	Prince George's County, Md.	Paint Branch	Potomac	10.8	
Little Patuxent River at mouth	Howard County, Md.	Patuxent River	West Chesapeake.	161	
Little Pipe Creek at mouth	Carroll County, Md.	Double Pipe Creek	Potomac	76.5	
Little Seneca Creek at mouth	Montgomery County, Md.	Seneca Creek	Potomac	38.8	
Little Wills Creek at mouth	Somerset County, Md.	Wills Creek	Potomac	45.6	in Pa.
Little Youghiogheny River at mouth	Garrett County, Md.	Youghiogheny River	Ohio	40.5	
Long Marsh Ditch at mouth (just above Beaver-dam Ditch)	Queen Anne's County, Md.	Mason Branch	East Chesapeake	18.4	
Lyons Creek at mouth	Anne Arundel County, Md.	West'n Br. (Patuxent)	West Chesapeake.	19.5	
McIntosh Run at head of estuary, 0.7 miles west of Leonardtown, Md.	St. Mary's County, Md.	Breton Bay	Potomac	34.1	
Magothy River at mouth	Anne Arundel County, Md.	Chesapeake Bay	West Chesapeake.	39.9	
Manokin River at mouth	Somerset County, Md.	Tangier Sound	East Chesapeake	125	
Marsh Creek at mouth	Adams County, Pa.	Monocacy River	Potomac	80.1	(1.00)

*Figures in parentheses indicate portion of drainage area in Maryland.

Name of Stream	Sources	Tributary to	Primary Drainage	Drainage Area (Square Miles)*	
Marshyhope Creek at Delaware State line	Kent County, Del	Nanticoke River	East Chesapeake	84.6	(4.03)
Maryshope Creek at mouth	Kent County, Del	Nanticoke River	East Chesapeake	214	(123)
Marsh Run at mouth	Franklin County, Pa	Antietam Creek	Potomac	31.2	(13.0)
Marsh Run at mouth	Washington County, Md	Potomac River	Potomac	20.2	
Maryland, State of				12,296	
Mason Branch at mouth	Queen Anne's County, Md	Tuckahoe Creek	East Chesapeake	48.3	
Mataponi Creek at mouth	Prince George's County, Md	West'n Br. (Patuxent)	West Chesapeake	19.7	
Mattawoman Creek at highway bridge at Mason Springs, Md.	Prince George's County, Md	Potomac River	Potomac	71.9	
Mattawoman Creek at mouth	Prince George's County, Md	Potomac River	Potomac	98.1	
Middle Creek at mouth	Adams County, Pa	Toms Creek	Potomac	26.9	(2.38)
Middle Patuxent River at mouth	Howard County, Md	Little Patuxent River	West Chesapeake	57.8	
Miles Creek at mouth	Talbot County, Md	Choptank River	East Chesapeake	13.6	
Miles River at mouth	Talbot County, Md	Eastern Bay	East Chesapeake	54.4	
Mill Run at mouth	Garrett County, Md	Youghiogheny River	Ohio	18.5	(14.7)
Monocacy River, gaging station, Jug Bridge, nr. Frederick, Md.	Adams County, Pa	Potomac River	Potomac	817	(589)
Monocacy River at mouth	Adams County, Pa	Potomac River	Potomac	970	(742)
Morgan Creek at mouth	Kent County, Md	Chester River	East Chesapeake	32.4	
Morgan Run at mouth	Carroll County, Md	No. Br. of Patapsco	West Chesapeake	44.6	
Muddy Branch at mouth	Montgomery County, Md	Potomac River	Potomac	19.2	
Nanjemoy Creek at mouth	Charles County, Md	Potomac River	Potomac	78.0	
Nanjemoy Creek at Trappe Bridge, nr. Nanjemoy, Md.	Charles County, Md	Potomac River	Potomac	17.6	
Nanticoke River at Delaware State line	Kent & Sussex Counties, Del	Chesapeake Bay	East Chesapeake	393	(7.5)
Nanticoke River at mouth	Kent & Sussex Counties, Del	Chesapeake Bay	East Chesapeake	815	(325)
Nassawango Creek at mouth	Wicomico County, Md	Pocomoke River	East Chesapeake	73.1	
Northeast River at mouth	Cecil County, Md	Chesapeake Bay	East Chesapeake	77.8	(70.0)
Northeast Creek at railroad crossing 0.5 miles north of Northeast, Md.	Chester County, Pa	Northeast River	East Chesapeake	25.4	(18.1)
Octoraro Creek at mouth	Lancaster County, Pa	Susquehanna River	Chesapeake	210	(34.4)
Octoraro Creek at Pennsylvania State line	Lancaster County, Pa	Susquehanna River	Chesapeake	176	(1.22)
Ohio River Basin in Maryland				419	
Otter Point Creek at mouth	Harford County, Md	Bush River	West Chesapeake	63.6	
Owens Creek at mouth	Frederick County, Md	Monocacy River	Potomac	39.8	
Owens Creek, gaging station at Lantz, Md.	Frederick County, Md	Monocacy River	Potomac	5.99	
Oxon Run at mouth	Prince George's County, Md	Potomac River	Potomac	13.5	(10.2)

*Figures in parentheses indicate portion of drainage area in Maryland.

Name of Stream	Source	Tributary to	Primary Drainage	Drainage Area (Square Miles)*	
Paint Branch at mouth	Montgomery County, Md.	Anacostia River	Potomac	31.5	
Passerdyke Creek at mouth	Wicomico and Worcester Counties, Md.	Wicomico Creek	East Chesapeake	11.7	
Patapsco River at highway crossing 1 mile south of Landsdowne, Md.	Carroll County, Md.	Chesapeake Bay	West Chesapeake.	359	
Patapsco River at mouth	Carroll County, Md.	Chesapeake Bay	West Chesapeake.	611	
Patapsco River, East Branch at mouth	Carroll County, Md.	N. Br. Patapsco	West Chesapeake.	21.1	
Patapsco River, North Branch, gaging station nr. Marriottsville, Md.	Carroll County, Md.	Patapsco River	West Chesapeake.	165	
Patapsco River, North Branch at mouth	Carroll County, Md.	Patapsco River	West Chesapeake.	171	
Patapsco River, North Branch, gaging station nr. Reisterstown, Md.	Carroll County, Md.	Patapsco River	West Chesapeake.	91.0	
Patapsco River, South Branch at mouth	Carroll, Howard, Frederick & Montgomery Counties, Md.	Patapsco River	West Chesapeake.	85.7	
Patapsco River, West Branch at mouth	Carroll County, Md.	No. Br. Patapsco	West Chesapeake.	20.8	
Patuxent River, gaging station nr. Burtonsville, Md.	Howard & Montgomery Counties, Md.	Chesapeake Bay	West Chesapeake.	127	
Patuxent River above mouth of Little Patuxent River	Howard & Montgomery Counties, Md.	Chesapeake Bay	West Chesapeake.	181	
Patuxent River at mouth	Howard & Montgomery Counties, Md.	Chesapeake Bay	West Chesapeake.	932	
Piney Creek at mouth	Adams County, Pa.	Monocacy River	Potomac	35.5	(28.0)
Piney Creek at Pennsylvania State line	Adams County, Pa.	Monocacy River	Potomac	9.6	(3.70)
Piney Run at mouth	Carroll County, Md.	So. Br. Patapsco	West Chesapeake.	18.2	
Piney Run, gaging station nr. Sykesville, Md.	Carroll County, Md.	Patapsco River	West Chesapeake.	11.4	
Piscataway Creek at head of estuary, half a mile west of Piscataway, Md.	Prince George's County, Md.	Potomac River	Potomac	60.5	
Piscataway Creek at mouth	Prince George's County, Md.	Potomac River	Potomac	70.4	
Pitts Creek at mouth	Worcester County, Md.	Pocomoke River	East Chesapeake	33.3	(21.2)
Pocomoke River at Delaware State line	Sussex County, Del.	Chesapeake Bay	East Chesapeake	26.8	in Del.
Pocomoke River at mouth	Sussex County, Del.	Pocomoke Sound	East Chesapeake	488	(436)
Pocomoke River at highway crossing, 1.3 miles northwest of Wesley, Md.	Sussex County, Del.	Chesapeake Bay	East Chesapeake	183	(144)
Port Tobacco River at head of estuary, 0.1 mile below mouth of Hoghole Run	Charles County, Md.	Potomac River	Potomac	28.2	
Port Tobacco River at mouth	Charles County, Md.	Potomac River	Potomac	47.4	

*Figures in parentheses indicate portion of drainage area in Maryland.

Name of Stream	Source	Tributary to	Primary Drainage	Drainage Area (Square Miles)*	
Port Tobacco Creek at mouth of Port Tobacco, Md.	Charles County, Md.	Port Tobacco River	Potomac	24.2	
Potomac River Basin in Maryland				3,824	
Potomac River at Chain Bridge, Washington, D. C.	Grant County, W. Va.	Chesapeake Bay	Potomac	11,569	(2,339)
Potomac River below mouth of Cacapon River, nr. Great Cacapon, W. Va.	Grant County, W. Va.	Chesapeake Bay	Potomac	4,027	(685)
Potomac River above mouth of Shenandoah River at Harpers Ferry, W. Va.	Grant County, W. Va.	Chesapeake Bay	Potomac	6,308	(1.119)
Potomac River below mouth of Shenandoah River at Harpers Ferry, W. Va.	Grant County, W. Va.	Chesapeake Bay	Potomac	9,361	(1,119)
Potomac River at mouth	Grant County, W. Va.	Chesapeake Bay	Potomac	14,669	(3,824)
Potomac River at Point of Rocks, Md.	Grant County, W. Va.	Chesapeake Bay	Potomac	9,651	(1,277)
Potomac River, North Branch, gaging station at Bloomington, Md.	Grant County, W. Va.	Chesapeake Bay	Potomac	287	(105)
Potomac River, North Branch at mouth	Grant County, W. Va.	Chesapeake Bay	Potomac	1,328	(501)
Potomac River, North Branch, gaging station at South Cumberland, Md.	Grant County, W. Va.	Chesapeake Bay	Potomac	875	(413)
Potomac River at Shepherdstown, W. Va.	Grant County, W. Va.	Chesapeake Bay	Potomac	5,936	(895)
Potomac River at gaging station nr. Washington, D. C.	Grant County, W. Va.	Chesapeake Bay	Potomac	11,560	(2,333)
Principio Creek at railroad crossing 0.4 mile south of Principio Furnace, Md.	Cecil County, Md.	Furnace Creek	East Chesapeake	18.4	
Pusey Branch at mouth	Wicomico County, Md.	Dividing Creek	East Chesapeake	11.5	
Red Line Branch at mouth	Queen Anne's County, Md.	Chester River	East Chesapeake	24.4	
Rock Creek at mouth	Adams County, Pa.	Monocacy River	Potomac	64.4	(0.05)
Rock Creek at District of Columbia line	Montgomery County, Md.	Potomac River	Potomac	59.8	
Rock Creek at mouth	Montgomery County, Md.	Potomac River	Potomac	76.5	(61.3)
Rock Creek at Q St. gaging station	Montgomery County, Md.	Potomac River	Potomac	75.8	(61.3)
Rock Creek at Sherrill Drive gaging station	Montgomery County, Md.	Potomac River	Potomac	62.2	(60.8)
Rockhole Creek at mouth	Anne Arundel County, Md.	Chesapeake Bay	West Chesapeake	12.7	
Romney Creek at mouth	Harford County, Md.	Chesapeake Bay	West Chesapeake	25.2	
St. Clement Creek at head of St. Clement Bay, half a mile south of Clements, Md.	St. Mary's County, Md.	St. Clement Bay	Potomac	21.9	
St. Leonard Creek at mouth	Calvert County, Md.	Patuxent River	West Chesapeake	22.5	
St. Leonard Creek at head of estuary, 0.3 mi. south of St. Leonard, Md.	Calvert County, Md.	Patuxent River	West Chesapeake	10.5	
St. Mary River at highway bridge at Great Mills, Md.	St. Mary's County, Md.	Potomac River	Potomac	28.1	
St. Mary River at mouth	St. Mary's County, Md.	Potomac River	Potomac	72.0	

*Figures in parentheses indicate portion of drainage area in Maryland.

GAZETTEER AND DRAINAGE AREAS OF STREAMS

Name of Stream	Source	Tributary to	Primary Drainage	Drainage Area (Square Miles)*	
Sams Creek at mouth	Carroll County, Md	Little Pipe Creek	Potomac	15.4	
Sassafras River at mouth	Newcastle County, Del	Chesapeake Bay	Chesapeake	104	(96.8)
Sassafras River at head of estuary 0.4 mile northwest of Sassafras, Md	Newcastle County, Del	Chesapeake Bay	Chesapeake	17.2	(9.7)
Savage River at gaging station at Bloomington, Md	Garrett County, Md	No. Br. of Potomac	Potomac	115	
Savage River at mouth	Garrett County, Md	No. Br. of Potomac	Potomac	116	
Sawmill Creek at highway crossing 1.5 miles north of Glenburnie, Md	Anne Arundel County, Md	Furnace Creek	West Chesapeake.	8.3	
Seneca Creek at gaging station at Dawsonville, Md	Montgomery County, Md	Potomac River	Potomac	101	
Seneca Creek at mouth	Montgomery County, Md	Potomac River	Potomac	129	
Severn Run at highway crossing 0.3 mile south of Benfield, Md.	Anne Arundel County, Md	Severn River	West Chesapeake.	23.8	
Severn River at mouth	Anne Arundel County, Md	Chesapeake Bay	West Chesapeake.	68.9	
Sewell Branch at Delaware State line	Kent County, Del	Andover Branch	East Chesapeake	14.1 in Del.	
Sewell Branch at mouth	Kent County, Del	Andover Branch	East Chesapeake	18.8	(3.32)
Sideling Hill Creek at mouth	Bedford County, Pa	Potomac River	Potomac	104	(23.1)
Sideling Hill Creek at Pennsylvania State line	Bedford County, Pa	Potomac River	Potomac	74.9	(2.42)
Sligo Branch at mouth	Montgomery County, Md	N. W. Br. Anacostia	Potomac	13.3	(11.3)
Snowy Creek at mouth	Preston County, W. Va	Youghiogheny River	Ohio	33.6	(2.70)
Southeast Creek at highway crossing at Church Hill, Md.	Queen Anne's County, Md	Chester River	East Chesapeake	14.2	
Southeast Creek at mouth	Queen Anne's County, Md	Chester River	East Chesapeake	54.5	
South River at mouth	Anne Arundel County, Md	Chesapeake Bay	West Chesapeake.	66.1	
Southwest Branch (of Western Branch of Patuxent River) at mouth	Prince George's County, Md	West'n Br. (Patuxent)	West Chesapeake.	15.4	
Susquehanna River at mouth	Otsego Lake, Otsego Co.,N.Y.	Chesapeake Bay	Chesapeake	27,469	(282)
Susquehanna River at Pennsylvania State line	Otsego Lake, Otsego County, N. Y. (N. Br.)	Chesapeake Bay	Chesapeake	26,960	(8.2)
Swan Creek at mouth	Harford County, Md	Chesapeake Bay	West Chesapeake.	26.5	
Swan Creek at highway bridge at Swan Creek, Md	Harford County, Md	Chesapeake Bay	West Chesapeake.	15.7	
Swanson Creek at mouth	Prince George's and Charles Counties, Md.	Patuxent River	West Chesapeake.	27.4	
Tarman Branch, gaging station nr. Chesterfield, Md	Anne Arundel County, Md	South River	West Chesapeake.	8.5	
Timmonstown Branch at mouth	Worcester County, Md	Pocomoke River	East Chesapeake	14.5	
Tinkers Creek at mouth	Prince George's County, Md	Piscataway Creek	Potomac	16.2	
Toms Creek at mouth	Franklin County, Pa	Monocacy River	Potomac	88.8	(29.6)
Toms Creek at Pennsylvania State line	Franklin County, Pa	Monocacy River	Potomac	36.6	(10.8)

*Figures in parentheses indicate portion of drainage area in Maryland.

Name of Stream	Source	Tributary to	Primary Drainage	Drainage Area (Square Miles)*	
Tonoloway Creek at mouth	Fulton County, Pa.	Potomac River	Potomac	25.9	(16.0)
Town Creek at mouth	Bedford County, Pa.	Potomac River	Potomac	156	(67.3)
Town Creek at Pennsylvania State line	Bedford County, Pa.	Potomac River	Potomac	60.9 in Pa.	
Town Creek, gaging station nr. Oldtown, Md.	Bedford County, Pa.	Potomac River	Potomac	148	(59.5)
Tred Avon River at mouth	Talbot County, Md.	Choptank River	East Chesapeake	45.8	
Trent Hall Creek at mouth	St. Mary's County, Md.	Patuxent River	West Chesapeake	13.1	
Tuckahoe Creek at highway crossing at Hillsboro, Md.	Queen Anne's County, Md.	Choptank River	East Chesapeake	99.8	
Tuckahoe Creek at mouth	Queen Anne's County, Md.	Choptank River	East Chesapeake	152	
Tuscarora Creek at mouth	Frederick County, Md.	Monocacy River	Potomac	16.8	
Tuscarora Creek at mouth	Frederick County, Md.	Potomac River	Potomac	20.5	
Unicorn Branch at mouth	Queen Anne's and Caroline Counties, Md.	Chester River	East Chesapeake	22.7	
Wagram Creek at outlet of Wagram Mill Pond	Worcester County, Md.	Pocomoke River	East Chesapeake	18.4	(12.9)
Watts Creek at mouth	Caroline County, Md.	Choptank River	East Chesapeake	24.2	(21.0)
Watts Branch at mouth	Montgomery County, Md.	Potomac River	Potomac	22.3	
Western Branch (of Patuxent River) at mouth	Prince George's County, Md.	Patuxent River	West Chesapeake	110	
Western Run at mouth	Baltimore County, Md.	Gunpowder Falls	West Chesapeake	85.4	
West Fork (Langford Bay) at mouth	Kent County, Md.	Langford Bay	East Chesapeake	16.6	
West River at mouth	Anne Arundel County, Md.	Chesapeake Bay	West Chesapeake	32.4	
Whitemarsh Run at highway crossing at Whitemarsh, Md.	Baltimore County, Md.	Bird River	West Chesapeake	15.9	
Wicomico Creek at mouth	Wicomico and Worcester Counties, Md.	Wicomico River	East Chesapeake	32.1	
Wicomico River at mouth	Wicomico County, Md.	Chesapeake Bay	East Chesapeake	238	(235)
Wicomico River at mouth	Prince George's County, Md.	Potomac River	Potomac	247	
Wicomico River at Salisbury, Md. (just above mouth of East Branch)	Wicomico County, Md.	Chesapeake Bay	East Chesapeake	42.1	(38.6)
Wicomico River, East Branch, gaging station nr. Salisbury, Md.	Wicomico County, Md.	Wicomico River	East Chesapeake	17.3	
Wicomico River, East Branch at mouth	Wicomico County, Md.	Wicomico River	East Chesapeake	25.1	
Wills Creek, gaging station nr. Cumberland, Md.	Somerset County, Pa.	No. Br. of Potomac	Potomac	247	(54.3)
Wills Creek at mouth	Somerset County, Pa.	No. Br. of Potomac	Potomac	254	(60.4)
Wills Creek at Pennsylvania State line	Somerset County, Pa.	No. Br. of Potomac	Potomac	184	(0.75)
Winters Run at highway crossing 0.3 miles west of Van Bibber, Md.	Harford County, Md.	Otterpoint Creek	West Chesapeake	55.4	
Wye East River below mouth of Sallie Harris Creek	Queen Anne's County, Md.	Wye River	East Chesapeake	24.4	

*Figures in parentheses indicate portion of drainage area in Maryland.

GAZETTEER AND DRAINAGE AREAS OF STREAMS

Source	Name of Stream	Tributary of	Primary Drainage	Drainage Area (Square Miles)*	
Wye River at mouth	Queen Anne's County, Md.	Eastern Bay	East Chesapeake	90.6	
Youghiogheny River at Friendsville, Md.	Preston County, W. Va., nr. Maryland State line	Monongahela River	Ohio	298	(229)
Youghiogheny River at Pennsylvania State line	Preston County, W. Va., nr. Maryland State line	Youghiogheny River	Ohio	397	(319)
Youghiogheny River at West Virginia State line (lat. 390° 21′ N., long. 79° 29′ W.)	Preston County, W. Va., nr. Maryland State line	Monongahela River	Ohio	32.8	(11.5)
Zekiah Swamp at Allens Fresh, Md.	Prince George's County, Md.	Wicomico River	Potomac	105	

*Figures in parentheses indicate portion of drainage area in Maryland.

APPENDIX B

INFORMATION CONCERNING SURFACE AND UNDER-GROUND WATER USES, STREAM GAGING STATIONS AND RUN-OFF VARIATIONS IN MARYLAND STREAMS.

TABLE 1. PUBLIC WATER SUPPLIES—SURFACE STREAMS.

Serial No.	Community	Population 1932	Stream	Dam Intake or	Water g. p. d. Consumption	Treatment	Remarks
1	Annapolis	12,820	Broad Creek (South River)	Dam	1,500,000	Filtration and Chlorination	Wells—Auxiliary sources
	Baltimore City	820,470			116,000,000		
2	Loch Raven		Gunpowder Falls	Dam		Filtration and Chlorination	
3	Prettyboy		Gunpowder Falls	Dam		Filtration and Chlorination	Under Construction
4	Avalon		Patapsco River	Dam		Filtration and Chlorination	Emergency Supply
	B. C. M. D.§§	55,000					Baltimore County Metropolitan Dist. served by Baltimore City Supply
5	Barton	689*	Bartlett Run (Georges Creek)	Dam	20,000	Chlorination	
6	Barrellville	200	Branch of Jennings Run (Wills Creek)	Intake	5,000	Chlorination	
7	Bridewell	1,400	Dorsey Run (Little Patuxent River)	Intake	200,000	Filtration and Chlorination	Maryland House of Correction
8	Bridewell		Little Patuxent River	Intake		Filtration and Chlorination	Auxiliary Supply
9	Camp Louise	200	Red Falls Creek (Antietam Creek)	Dam	25,000	Filtration and Chlorination	Summer Camp
10	Conowingo	300	Susquehanna River	Dam	10,000	Filtration and Chlorination	Intake in Power Dam
11	Cumberland	39,483	Evitts Creek	Dam	7,000,000	Filtration and Chlorination	
12	Cumberland		Evitts Creek	Dam		Filtration and Chlorination	
13	Dist. of Columbia	486,869*	Potomac River	Dam	95,000,000	Filtration and Chlorination	
14	Elkton	3,478	Big Elk Creek	Intake	250,000	Filtration and Chlorination	
15	Ellicott City	1,216*	Sucker Branch (Patapsco River)	Intake	90,000	Chlorination	
16	Emmitsburg	1,300	Turkey Creek (Monocacy River)	Intake	No record	Chlorination	Auxiliary Supply
17	Fort Geo. G. Meade	1,500a 5,000b	Little Patuxent River	Intake	500,000a 1,800,000b	Filtration and Chlorination	U. S. Army Post
	Frederick	15,173			1,500,000		
18			Fishing Creek (Monocacy River)	Dam		Chlorination	
19			Tuscarora Creek (Monocacy River)	Intake		Chlorination	
20			Ox Creek (Monocacy River)	Intake		Chlorination	Auxiliary Supply
21			Linganore Creek (Monocacy River)	Intake		Filtration and Chlorination	Auxiliary Supply
22	Frostburg	5,588*	Savage River	Intake	400,000	Chlorination	
23			Piney Run (Casselman River)	Intake		Chlorination	
	Hagerstown	31,475			4,500,000		
24			Potomac River	Intake		Filtration and Chlorination	Intake above Dam at Williamsport of The Potomac Edison Co.
25			Warner Gap Hollow (Antietam Creek)	Intake		Chlorination	
26			Raven Rock Hollow (Antietam Creek)	Intake		Chlorination	
	Funkstown	718					Supplied from Hagerstown System
	Smithsburg	601					Supplied from Warner Gap Hollow and Raven Rock Hollow sources
	Williamsport	1,810					Supplied from Hagerstown System
27	Hancock	947*	Little Tonoloway Creek	Dam	150,000	Filtration and Chlorination	
28	Havre de Grace	3,985	Susquehanna River	Intake	300,000	Filtration and Chlorination	
29	Kempton	500	Potomac River	Intake	125,000	Chlorination	Auxiliary Supply.
30	Laurel	2,596	Patuxent River (Bear Branch)	Dam	280,000	Filtration and Chlorination	
32	Lonaconing	2,508	Koontz Run (Georges Creek)	Dam	200,000	Chlorination	
33			Jackson Run (Georges Creek)	Dam		Chlorination	
34	Lord	60	Wright's Run (Georges Creek)	Intake	5,000	Chlorination	
35	Luke	1,064	Potomac River	Dam	175,000	Filtration and Chlorination	Supply obtained from W. Va. Pulp & Paper Co.
36	Midland	865*	Elklick Run (Georges Creek)	Dam	50,000	Chlorination	
37	Owings Mills	1,100	Gwynns Falls	Intake	150,000	Filtration and Chlorination	Rosewood State Training School
38	Perry Point	1,800	Mill Creek	Dam	600,000	Filtration and Chlorination	U. S. Veterans Bureau Hospital
39	Perryville	715	Mill Creek	Dam	50,000	Chlorination	
40	Piedmont, W. Va.	2,241*	Savage River	Dam	240,000	Filtration and Chlorination	Dam located in Maryland
41	Port Deposit	963*	E. Rock Run (Susquehanna River)	Intake	100,000	Chlorination	
42	Salisbury	11,753	E. Branch Wicomico River	Dam		Chlorination	Emergency Supply.
43	Sanatorium	600	Owens Creek (Monocacy River)	Intake	88,000	Chlorination	Maryland Tuberculosis Sanatorium—Auxiliary Supply
44	Savage	1,000	Little Patuxent River	Intake	20,000	Filtration and Chlorination	Intake in Mill Race of Savage Mfg. Co.
45	Sherwood Forest	500	Tributary of Severn River	Intake	100,000	Filtration and Chlorination	
46	Sykesville	2,800	Piney Run (Patapsco River)	Intake	500,000	Filtration and Chlorination	Springfield State Hospital and Md. Tuber. Sanatorium (Colored Br.)

TABLE 1—Continued

Serial No.	Community	Population 1932	Stream	Dam or Intake	Water Consumption g. p. d.	Treatment	Remarks
47	Thurmont	1,209	High Run (Monocacy River)	Intake	100,000	None	
48	Walkersville	629	Branch of Monocacy River	Intake	50,000	None	
	W. S. S. D.§	60,000			4,000,000		
49	Burnt Mills		Northwest Branch (Anacostia River)	Dam		Filtration and Chlorination	
50	Hyattsville		Northwest Branch (Anacostia River)	Intake		Filtration and Chlorination	
51	Takoma Park		Sligo Branch (Anacostia River)	Dam		Filtration and Chlorination	Emergency Supply
52	Westernport	3,440*	Savage River	Dam	450,000	Chlorination	
53	Westminster	4,670	Cranberry Branch (Patapsco River)	Dam	400,000	Filtration and Chlorination	
54	Woodensburg	125	Branch of Patapsco River	Dam	20,000	Chlorination	Montrose School for Girls
55	Franklin, W. Va.	431*	S. Branch Potomac River	Intake	50,000	Chlorination	
56	Keyser, W. Va.	6,048*	New Creek (Potomac River)	Dam	650,000	Filtration and Chlorination	Also has spring supply
57	Moorefield, W. Va.	734*	S. Fork of S. Branch of Potomac River	Intake	60,000	Chlorination	Also has spring supply
58	Petersburg, W. Va.	1,410*	S. Branch of Potomac River	Intake	70,000	Chlorination	Infiltration crib in creek bank
59	Romney, W. Va.	1,441*	S. Branch of Potomac River	Intake	60,000	Filtration and Chlorination	
60	Shepherdstown, W. Va.	1,888*	Potomac River	Intake	150,000	Chemical Precipitation and Chlorination	
61	Alexandria, Va.	24,149*	Holmes Run	Dam	3,000,000‡	Filtration and Chlorination	‡Filter Plant capacity, 3.0 m. g. d.
62	Berryville, Va.	1,094*	Tributary of Shenandoah River	Dam°	80,000†	Chlorination	°Storage Impounded, 2.6 m. g.; also has spring supply
63	Edinburg, Va.	498*	Branch of N. Fork of Shenandoah River	Intake	50,000†	None	Also has springs supply
64	Front Royal, Va.	2,424*	Harmony Hollow and Happy Creek (Shenandoah River)	Intake	1,000,000‡	Filtration and Chlorination	‡Filter Plant capacity, 1.0 m. g. d.
65	Harrisonburg, Va.	7,232*	Dry River (Shenandoah River)	Dam	600,000†	Chlorination	
66	Luray, Va.	1,459*	Mary's Rock and Stoney Man (Shenandoah River)	Dam°	250,000†	Chlorination	°Storage impounded, 3.5 m. g.
67	Mt. Jackson, Va.	554*	Branch of N. Fork of Shenandoah River	Intake	40,000	None	
68	New Market, Va.	464*	Branch of N. Fork of Shenandoah River	Dam°	No record	None	°Storage impounded, 3.2 m. g.
69	Quantico, Va.	3,000*	Chopawamsic Creek	Intake	2,000,000‡	Filtration and Chlorination	‡Filter Plant capacity, 2.0 m. g. d.
70	Shenandoah, Va.	1,980*	S. Fork of Shenandoah River	Dam	500,000‡	Filtration	‡Filter Plant capacity, 0.5 m. g. d.
71	Shenandoah, Va.	300*	S. Fork of Shenandoah River	Intake	1,000,000‡	Filtration and Chlorination	‡Filter Plant capacity, 1.0 m. g. d. (Serves Western R. R. engines and small community)
72	Staunton, Va.	11,990*	North River (Shenandoah River)	Dam°	1,300,000†	Lime and Chlorination	°Storage impounded, 124 m. g.
73	Strasburg, Va.	1,901*	N. Fork of Shenandoah River	Dam°	100,000†	None	°Storage impounded, 20 m. g.; also has spring supply
74	Woodstock, Va.	1,552*	Little Stony Creek (Shenandoah River)	Intake	100,000†	Chlorination	Also has springs supply
75	Centerville, Pa.	175	Tributary of Evitts Creek	Intake	6,000	None	
76	Chambersburg, Pa.	13,800	Birch Creek (Conococheague Creek)	Dam	1,500,000	Chlorination	
77	Colerain Township, Pa.	No record	W. Branch of Octoraro Creek	Dam	1,000,000	Chlorination	Railroad and a few dwellings
78	Fayetteville, Pa.	600	Cold Spring Run (Conococheague Creek)	Intake	45,000	Chlorination	
79	Gettysburg, Pa.	5,600	Marsh Creek	Intake	500,000	Filtration and Chlorination	Filter Plant capacity, 1.0 m. g. d.
80	Hyndman, Pa.	1,200	Laurel Run (Wills Creek)	Intake	80,000	None	Emergency intake on Little Wills Creek
81	Lower Oxford, Pa.	2,600	Octoraro Creek	Dam	1,000,000	Chlorination	Operated by Octoraro Water Co.—Serves Penna. R. R. and a few dwellings
82	Mercersburg, Pa.	1,700	Buck Run (Conococheague Creek)	Dam	200,000	Chlorination	Storage impounded, 6.0 m. g.
83	Mt. Alto, Pa.	1,000	Tributary of W. Branch of Antietam Creek	Intake	137,000	Chlorination	Pennsylvania State Sanatorium; also has springs supply
84	Parkesburg Borough, Pa.	2,300	Glenn Run (Octoraro Creek)	Intake	78,000	Chlorinated at Pumping Station ahead of storage—Rechlorinated before distribution.	Emergency supply. Main supply is springs and wells
85	Rouzerville, Pa.	1,500	Red Falls Creek (Antietam Creek)	Intake	1,000,000	Filtration and Chlorination	Stream originates in and returns to Maryland
86	Waynesboro, Pa.	9,700	Little Antietam Creek	Dam	48,000	Chlorination	

*1930 Population. §Washington Suburban Sanitary District. a—9 months. b—3 months. §§Baltimore County Metropolitan District.
†As noted in 1916 Report on Pollution and Sanitary Condition of the Potomac River Watershed—Treasury Department Bulletin No. 104, Feb. 1916.

TABLE NO. 2—SEWAGE DISCHARGES.

Serial No.	Community	Population 1932	Point of Discharge	Quantity of Sewage g. p. d.	Treatment	Remarks
87	Aberdeen	1,278	Swan Creek	100,000	Coarse Screens, Settling, Trickling Filter, Separate Sludge Digestion	
88	Aberdeen Proving Grounds	500	Swan Creek	250,000	Coarse Screens, Settling	U. S. Army Post
89	Annapolis and Naval Academy	12,820	Severn River and Spa Creek	2,500,000	None	Including sewage from U. S. Naval Academy
	Baltimore City	820,470				
90	Back River Sewage Plant	.....	Back River	62,000,000	Coarse Screens, Primary Settling, Fine Screens, Trickling Filter, Final Settling, Separate Sludge Digestion	
91	Curtis Bay B. C. M. D.°	533‡	Stonehouse Cove (Patapsco River)	72,000		Remainder of District discharges into Balto. City sewers or small streams within the District
92	Dundalk	6,500	Patapsco River	400,000	Coarse Screens, Settling	
93	Halethorpe	14,000	Patapsco River	2,035,000	None	
94	Overlea	See Remarks	Red House Run (Back River)	1,500,000	Coarse Screens, Settling	Contributing population not known
95	Sparrows Point	10,000	Jones Creek (Patapsco River)	1,000,000	Settling	
96	Towson	6,000	Towson Run (Jones Falls)	500,000	Coarse Screens, Primary Settling, Trickling Filter, Final Settling	
97	Towson	250	Minebank Run (Gunpowder Falls)	30,000	Coarse Screens, Pre-Chlorination, Settling.	Eudowood Sanatorium
98	Barton	689*	Georges Creek	20,000†	None	Estimated water consumption=20,000 gal. daily
99	Betterton	296*	Sassafras River	No Record	Settling	Summer resort
100	Bridewell	1,400	Dorsey Run (Little Patuxent River)	200.000	Coarse Screens, Settling, Trickling Filter, Final Settling, Chlorination	Maryland House of Correction
101	Brunswick	3,671	Potomac River	500,000†	None	
102	Cambridge	8,780	Choptank River	2,350,000	None	
103	Cambridge	350	Choptank River	50,000	Settling	Eastern Shore State Hospital
104	Camp Ritchie & Camp Louise	1,200	Red Falls Creek (Antietam Creek)	160,000	Coarse Screens, Pre-Chlorination, Settling, Sand Filters, Separate Sludge Digestion.	Both camps open during summer months only
105	Camp Holabird	.....	Colgate Creek (Patapsco River)	No Record	Settling, Chlorination	U. S. Army Post
106	Centerville	1,291*	Corsica River (Chester River)	162,000†	None	
107	Chesapeake Beach	.....	Chesapeake Bay	15,000†	Settling, Chlorination	Summer resort
108	Chestertown	2,869	Chester River	30,000	None	
109	Conowingo	300	Susquehanna River	20,000†	Settling, Chlorination	
110	Crisfield	3,850*	Little Annemessex River	216,000†	None	
111	Crownsville	1,100	Branch of Bacon Ridge Branch (South River)	150,000†	Coarse Screen, Settling, Trickling Filter, Final Settling, Sand Filters	Crownsville State Hospital
112	Cumberland	39,483	Potomac River	7,000,000†	None	
113	Deer Park	249	Youghiogheny River	.....	None	
114	Delmar	1,180*	Branch of N. Branch of (Wicomico River)	135,000†	Coarse Screens, Settling	
115	Denton	1,611	Choptank River	180,000†	None	
116	District of Columbia	486,869	Potomac River	95,000,000†	Coarse Screens	
117	Easton N. Plant	4,235	Tred Avon River	250,000	Coarse Screens, Pre-Chlorination, Settling.	
118	Easton S. Plant		Tred Avon River	425,000	Coarse Screens, Pre-Chlorination, Settling.	
119	Eastport	1,468	Spa and Back Creeks	37,000	None	
120	Emmitsburg	800	Branch of Monocacy River	100 000†	Coarse Screens, Settling	Mt. St. Mary's College
121	Emmitsburg	400	Toms Creek (Monocacy River)	100,000†	Coarse Screens, Settling, Chlorination	St. Joseph's Academy
122	Elkton	3,478	Elk River	250,000†	None	
123	Federalsburg	1,387	Nanticoke River	150,000†	None	
124	Fort Geo. G. Meade	1,500a 5,000b	Little Patuxent River (max.)	1,600,000	Coarse Screen, Settling, Chlorination	U. S. Army Post. Average flow prorated to water consumption=736,627
125	Frederick	15,173	College Creek (Monocacy River)	1,500,000†	None	
126	Frostburg	5,588*	Georges Creek and Jennings Run	400,000†	None	
127	Gaithersburg and Washington Grove	2,500	Muddy Branch (Potomac River)	57,600†	Coarse Screens, Settling, Trickling Filter, Final Settling, Separate Sludge Digestion	W. S. S. D.‖ control

No. Serial	Community	1932 Population	Point of Discharge	Quantity of Sewage g. p. d.	Treatment	Remarks
128	Glenburnie	1,000	Patapsco River	40,000	None	
129	Greensboro	780	Choptank River	50,000†	None	
130	Hagerstown	31,475	Antietam Creek	2,500,000	Coarse and Fine Screens, Aeration, Settling.	
131	Hancock	947*	Potomac River	150,000†	None	
132	Havre de Grace	3,985*	Susquehanna River	300,000†	None	
133	Henryton	165	Patapsco River	34,000†	Coarse Screen, Settling, Chlorination	Md. Tuberculosis Sanatorium—Colored Branch
134	Laurel	2,596	Patuxent River	280,000†	None	
135	Linthicum	200	Branch of Patapsco River	8,000	Settling	
136	Linthicum, Shipley and Overlook	1,225	Patapsco River	49,000	Settling	
137	Loch Raven	400	Gunpowder Falls	65,000†	Settling	Maryland Training School for Boys
138	Lonaconing	2,508	Georges Creek	200,000†	None	
139	Luke	1,064*	Potomac River	175,000†	None	
140	McDonogh	350	Gwynns Falls	80,000	None	McDonogh School
141	Middle River	1,000	Middle River	15,000	Coarse Screens, Settling, Trickling Filter, Final Settling, Sand Filters	Glenn L. Martin Airplane Factory
142	Midland	865*	Georges Creek	50,000†	None	
143	Mt. Pleasant	125	Keyser's Run (Patapsco River)	15,000	Coarse Screens, Settling, Trickling Filter, Chlorination	Tuberculosis Sanatorium
144	Mt. Wilson	220	Gwynns Falls	27,000†	Coarse Screens, Settling, Chlorination	Md. Tuberculosis Sanatorium, Mt. Wilson Branch
145	North Linthicum	225	Branch—Patapsco River	10,000‡	Settling	
146	Oakland	1,662	Little Youghiogheny River	15,000†	None	
147	Ocean City	998	Sinepuxent Bay	335,000†	None	
148	Owings Mills	1,100	Gwynns Falls	150,000†	Coarse Screen, Settling, Trickling Filter	Rosewood State Training School
149	Perryville	715	Chesapeake Bay	50,000†	None	
150	Perry Point	1,800	Chesapeake Bay	600,000†	None	U. S. Veterans' Bureau Hospital
151	Pocomoke City	2,645	Pocomoke River	150,000†	None	
152	Port Deposit	963*	Susquehanna River	100,000†	None	
153	Preston	315*	Choptank River	70,000†	None	
154	Princess Anne	976	Manokin River	162,000†	None	
155	Public Landing	250	Paw Paw Creek (Chincoteague Bay)	No Record	Settling, Chlorination	Summer resort
156	Ridgely	703*	Branch of Choptank River	118,000†	None	Sewage treatment plant has not been operated for years
157	Rockville	1,483	Cabin John Creek (Potomac River)	90,000	Coarse Screen, Settling, Sand Filters	
158	Roxbury	75	Antietam Creek	.....	Settling and Separate Sludge Digestion	Maryland State Penal Farm—Plant under construction
159	Salisbury	11,753	Wicomico River	1,000,000†	None	
160	Sanatorium	600	Friends Creek (Monocacy River)	88,000†	Coarse Screens, Settling, Trickling Filter, Final Settling, Separate Sludge Digestion	Maryland Tuberculosis Sanatorium
161	Savage	1,000	Little Patuxent River	20,000†	Coarse Screens, Settling, Chlorination	
162	Security	329	Antietam Creek	25,000†	None	
163	Snow Hill	1,604*	Pocomoke River	216,000†	None	
164	St. Michaels	1,308*	Miles River	75,000†	None	
165	Sykesville	2,800	Piney Run (Patapsco River)	470,000†	Settling, Trickling Filter, Final Settling	Springfield State Hospital
166	Tolchester Beach	.....	Chesapeake Bay	No Record	Coarse Screens, Settling, Sand Filters	Summer resort
167	W. S. S. D.‖	60,000	Anacostia River	4,000,000†	Have numerous outlets in District eventually reaching Potomac River	
168	Westernport	3,440*	Potomac River	450,000†	None	
169	Woodensburg	125	Branch of Patapsco River	20,000†	Coarse Screens, Settling	Montrose School for Girls
170	Berkeley Springs, W. Va.	1,039*	Warm Spring Run (Potomac River)	100,000†	None	
171	Charlestown, W. Va.	2,434*	Evitt Run (Shenandoah River)	275,000†	Settling, Sludge Bed	
172	Franklin, W. Va.	431*	S. Branch of Potomac River	50,000†	None	
173	Harpers Ferry and Bolivar, W. Va.	1,300*	Shenandoah and Potomac Rivers	150,000†	None	
174	Keyser, W. Va.	6,048*	New Creek and Potomac River	650,000†	None	
175	Martinsburg, W. Va.	14,857*¶	Tuscarora Creek—Opequon Creek	No Record	Settling, Trickling Filter, Final Settling	¶50%± of population contributes to disposal plant. Remainder, untreated to stream

TABLE NO. 2—Continued.

Serial No.	Community	Population 1932	Point of Discharge	Quantity of Sewage g. p. d.	Treatment	Remarks
176	Moorefield, W. Va.	734*	S. Fork of S. Br. of Potomac River	60,000†	None	
177	Petersburg, W. Va.	1,410*	S. Branch of Potomac River	70,000†	None	
178	Piedmont, W. Va.	2,241*	Potomac River	240,000†	None	
179	Ridgeley, W. Va.	1,972*	N. Branch of Potomac River	38,000†	None	
180	Romney, W. Va.	1,441*	S. Branch of Potomac River	60,000†	None	
181	Shepherdstown, W. Va.	1,888*	Potomac River	150,000†	None	
182	Alexandria, Va.	24,149*	Potomac River	3,000,000		3.0 m. g. d. filter plant—Sewage flow assumed same
183	Bridgewater, Va.	951*	North River (Shenandoah River)	10,000§	None	
184	Colonial Beach, Va.	721*	Potomac River	50,000		
185	Edinburg, Va.	498*	N. Fork of Shenandoah River	50,000§	None	
186	Elkton, Va.	965*	S. Fork of Shenandoah River	90,000§	None	
187	Front Royal, Va.	2,424*	S. Fork of Shenandoah River	1,000,000	None	1.0 m. g. d. filter plant—Sewage flow assumed same
188	Harrisonburg, Va.	7,232*	Blacks Run (Shenandoah River)	600,000§	Settled	
189	Leesburg, Va.	1,640*	Tuscarora Creek (Goose Creek)	No Record	None	
190	Luray, Va.	1,459*	Hawksbill Creek (Shenandoah River)	250,000§	None	
191	Manassas, Va.	1,215*	Bull Run	No Record	Settling, Trickling Filter, Chlorination	
192	Mt. Jackson, Va.	554*	N. Fork of Shenandoah River	40,000§	None	
193	New Market, Va.	464*	N. Fork of Shenandoah River	No Record	None	
194	Quantico, Va.	3,000*	Chopawamsic Creek	2,000,000		2.0 m. g. d. filter plant—Sewage flow assumed same
195	Shenandoah, Va.	1,980*	S. Fork of Shenandoah River	500,000†	None	0.5 m. g. d. filter plant—Sewage flow assumed same
196	Staunton, Va.	11,990*	Lewis Creek (Shenandoah River)	650,000§	None	Year 1916 water consumption=1.3 m. g. d. Town 50% sewered, sewage flow assumed as 50% of 1.3 m. g. d.
197	Waynesboro, Va.	6,226*	South River (Shenandoah River)	200,000§	None	
198	Winchester, Va.	10,885*	Opequon Creek	800,000	Settling, Trickling Filter, Final Settling	
199	Woodstock, Va.	1,552*	N. Fork of Shenandoah River	100,000§	None	
200	Chambersburg, Pa.	13,800±	Conococheague Creek	1,000,000‡	Settling, Trickling Filter, Final Settling, Sludge Beds	
201	Gettybsurg, Pa.	5,600±	Marsh Creek (Monocacy River)	600,000‡	Screens, Settling, Contact Basin, Sludge Beds	
202	Hyndman, Pa.	1,200±	Wady Run (Little Wills Creek)	50,000‡	None	
203	Lower Oxford, Pa.	2,600±	Big Elk Ck., Little Elk Ck. and Tweed Ck.	60,000‡	None	
204	Mt. Alto, Pa.	1,000±	Rocky Creek (Conococheague Creek)	150,000‡	Settling, Trickling Filter, Chlorination, Final Settling, Sludge Beds	Pennsylvania State Sanatorium
205	Waynesboro, Pa.	9,700±	Little Antietam Creek	1,400,000‡	None	
206	Bridgeville, Del.	987*	Nanticoke River	90,000‡	None	90 Percent sewered
207	Laurel, Del.	2,277*	Nanticoke River	188,000‡	None	75 Percent sewered
208	Seaford, Del.	2,468*	Nanticoke River	200,000‡	None	80 Percent sewered

*Refers to Year 1930 Population.
‡Estimated.
§Water Consumption as noted in 1916 Report on Pollution and Sanitary Condition of the Potomac River Watershed—Treasury Department Bulletin No. 104, Feb. 1916.
†Assumed same as Water Consumption.
°B. C. M. D.=Baltimore County Metropolitan District.
‖W. S. S. D.=Washington Suburban Sanitary District.
a—9 months. b—3 months.

TABLE 3. INDUSTRIAL WASTE DISCHARGES.

Serial No.	Location	Name of Plant	Point of Waste Discharge	Source of Wastes	Product Manufactured	Waste Discharge, g. p. d.	Treatment
209	Asbestos	Congoleum-Nairn Co	Patapsco River (N. Branch)	Waste pulp from save-all process	Congoleum flooring base	Negligible	Chemical precipitation.
210	Cumberland	Celanese Corp. of America	Potomac River	Acid discharge	Artificial silk	13,000,000	Settling, cinder filters.
211	Cumberland	Kelly-Springfield Tire Co	Potomac River	Cooling and condensing water	Rubber products (auto tires)	30,000,000	
212	Cumberland	Union Tanning Co	Wills Creek	Soda and acid bleach, soaks, limes, bate pool, spent liquors and washings	Leather	118,500	
213		Cumberland Laundry Co	Wills Creek	Rinse water and sanitary sewage	Clean clothes	25,000	
214		N. & G. Taylor Co	Direct to C. & O. Canal	Cooling and condensing water, pickling tubs.†	Tin plate	100,000	†1000 gallons at 2% acid.
215	Elk Mills	Baldwin Mfg. Co	Big Elk Creek	Fabric dyeing	Fabric dye works	40,000	Settled.
216	Franklintown	Franklintown Laundry Co	Gwynns Falls	Soapy water, grease and clothing dirt from washing and rinsing clothes	Clean clothes	14,000	Chemical precipitation and sand filtration.
217	Frederick	Union Mfg. Co	Carroll Creek (Monocacy R.)	Manufacturing, finishing and dyeing hosiery	Hosiery	20,000	None—300 employees (san. sewer to tank to creek).
218	Freeland Station	Bentley Paper Mills, Inc	Little Gunpowder Falls	Wrapping, bogus and case lining paper manufacturing process	Wrapping, bogus & case lining paper	229,000 (estimated).	
219	Freeland Station	James Lowe & Sons	Little Gunpowder Falls	Wrapping, bogus and case lining paper manufacturing process	Wrapping, bogus & case lining paper	229,000 (estimated).	
220	Glyndon	Glyndon Laundry	Slade Run (Gunpowder R.)	Laundry process (washing and rinsing clothes)	Clean clothes	30,000	None—20 employees.
221	Ilchester	Bartgis Bros. Co	Patapsco River	Paper pulp and small quantity of sulphite wood pulp condenser water (Pulp waste is negligible.)	Paper board	3,600,000	Improvised closed in save-all system.
222	Luke	West Virginia Pulp Paper Co	Potomac River	Soda-ash recovery, condensing water, leacher wastes, lime absorption plant, digesters, pulp mill sewer, paper machines, heaters, save-all tanks, coating mills, black water, white water, reclaiming plant, and sanitary sewage	Paper and activated carbon	8,000,000	Save-all process and lime burners.
223	Oakland Mills	Melville Woolen Co	Patapsco River	Dyeing and wet finishing	Woolen cloth	40,000	None—3600 g. p. d. sanitary sewage.
224	Oella	Wm. J. Dickey & Sons	Patapsco River	Dye vats, washers, floor washings, boiler blow-down, sanitary sewage, miscellaneous plant wastes	Woolen cloth	250,000	None.
225	Providence	Jessup & Moore Paper Co., Kenmore Mills	Little Elk Creek	Wash water	Book-making paper	Some floor washings	Save-all recovery—150 g. p. d. sanitary sewage.
226	Rockland	Rockland Bleachery & Dye Works	Jones Falls	Bleachers and de-sizers	Fabric bleaching and de-sizing	40,000	None—Concentrated waste discharged once per day, above dam, over period of one-half hour.
227	Williamsport	W. D. Byron & Sons, Co., Inc	Conococheague Creek	Tan liquors, lime water, coke water, wash water, dyes, sumac, floor washings, and sanitary sewage	Leather tanning	300,000	None—400 employees.
228	Greenspring, W. Va	Baltimore & Ohio R. R. Tie Treatment Plant	Potomac River (N. Branch)	Creosote drippings	R. R. ties and R. R. timber	None	Closed-in system, discharges allowed to reach river from the plant are accidental.
229	Halltown, W. Va., nr. Harpers Ferry	Halltown Paper Board Co	Branch of Shenandoah R.	Plant wastes	Paper board	1,440,000	None.
230	Martinsburg, W. Va	Berkeley Woolen Mills	Tuscarora Creek (Opequon Creek)	Plant wastes	Woolen goods	200,000	None.
231	Moorefield, W. Va	Union Tanning Company (Moorefield Tannery)	S. Fork of S. Branch of Potomac R.	Vats, tan liquors, floor washings, bleach, unhairing	Leather	16,148	Settled—capacity=3,015lb hide daily.
232	Paw Paw, W. Va	Paw Paw Tannery	Potomac River (N. Branch)	Tan liquors and associated waste	Leather	100,000	Settled—capacity=2,100lb hide daily.
233	Petersburg, W. Va	Union Tanning Company (Riverside Tannery)	Lunice Creek (S. Branch of Potomac R.)	Vats, tan liquors, floor washings, bleach, unhairing	Leather	28,320	Portion settled—capacity=5,280lb hide daily.
234	Gore, Va	Sand Washing Plant	Black Creek	Waste from sand washing plant	Sand	No record	
235	Luray, Va	Tannery	Hawksbill Creek (Shenandoah R.)	Tan liquors	Leather	150,000*	*1916 Potomac River report (present capacity=60 hides daily).
236	Waynesboro, Va	Crompton Shenandoah Co	South River (Shenandoah River)	Soap, soda ash, caustic and some chlorine	Corduroy	300,000±	None.
237		Du Pont Rayon Co		Sulphuric and acetic acids	Rayon	500,000±	Settled.
238		Edison General Electric Co		Fixing liquors, soda ash and chromic acid	Electrical appliances	No record	None.
239		Stehlis Silk Mills		Wash water and marking dyes	Silk	No record	None.
240	Winchester, Va.	Virginia Woolen Mills	Opequon Creek	Chrome dye, acetic acid, glauber salts, sulphuric acid, soap & fibrous material.	Wolen cloth	125,000	None.
241		Shenandoah Box Board Co		.....	4-Ply liner	No record	Save-all intercepts most fibrous material (raw product is old paper).
242		Winchester Woolen Mills		Soda ash, soap, fibrous material and dirt	Woolen cloth	47,000	None.
243	Chambersburg, Pa.	Chambersburg Gas Co	Conococheague Creek	Minor pollution	Gas (185,000± cu. ft. per day)		Separator, filter and partial recirculation for retention of tar & oil.
244	Gettysburg, Pa.	Gettysburg Gas Co	Rock Creek	Minor pollution	Gas (50,000± cu. ft. per day)		Separators for tar removal. No recirculation of waste waters.
245	Lower Oxford, Pa.	Oxford Steam Laundry	Big Elk Creek	Waste from laundry	Clean clothes	18,000±	None.
246	Mercersburg, Pa.	W. D. Byron & Sons Co., Inc	Conococheague Creek	Waste from a mineral tannery process	Leather	Undetermined	None.
247	Oxford, Pa.	Citizens Gas & Fuel Co	Little Elk Creek	Minor pollution	Gas (40,000 cu. ft. per day)	No record	Separator for tar removal.
248	Waynesboro, Pa.	Waynesboro Gas Co	Little Antietam Creek	Minor pollution	Gas (138,000± cu. ft. per day)	No record	Separator for tar removal. Some waste water is recirculated.

TABLE 4—HYDRO-ELECTRIC PLANTS.

Serial No.	Operating Company	Stream	Total Output Head Feet	Total Output Horse Power	Drainage Area Square Miles	Height of Dam Feet	Storage Million Gallons	Remarks
249	Consolidated Gas, Electric Light & Power Co. of Balto.	Patapsco River	27	1,000	314			
250	Maryland Realty Co. of Balto., Laurel, Md.	Patuxent River				33.5		Power plant inoperative since 1909—Capacity unknown
251	Maryland Light & Power Co., Boonsboro, Md.	Antietam Creek	15	360				
252	Susquehanna Power Co., Conowingo, Md.	Susquehanna River	89	378,000				
253	Youghiogheny Hydro-Elec. Corp., nr. Friendsville, Md.	Deep Creek (Youghiogheny River)	400	24,000				
254	Community Power Co., Petersburg, W. Va.	Potomac River (South Branch)		565				
255	Harpers Ferry Elec. Light & Power Co., W. Va.	Potomac River	27	1,022		5	Negligible	
256	Northern Virginia Power Co., Great Cacapon, W. Va.	Cacapon River	22	1,120		22	Run of River	
257	Northern Virginia Power Co., Millville, W. Va.	Shenandoah River	22.5	1,840		22.5	Run of River	
258	Potomac Light & Power Co., Hedgesville, W. Va.	Potomac River	16.5	1,120		16.5	Run of River	
259	Potomac Light & Power Co., Shepherdstown, W. Va.	Potomac River	17.5	1,000		17.5	Run of River	
260	Bull Run Power Co., Manassas, Va.	Bull Run	16	272				
261	City of Harrisonburg, Va.	Shenandoah River						
262	Massanutten Power Corp., nr. Shenandoah, Va.	Shenandoah River	10.5	1,470				
263	North River Elec. Co., nr. Bridgewater, Va.	Shenandoah River	10	163				
264	Page Power Co., nr. Luray, Va.	Shenandoah River	14	2,550				"Luray Plant"
	Virginia Public Service Co., Va.							
265	Edinburg	Shenandoah River (N. Fork)	12	220				
266	Grottoes	Shenandoah River	22	420				
267	Leesburg	Goose Creek	18	800				
268	Rockland	Shenandoah River	7	90				
269	Timberville	Shenandoah River (N. Fork)	17.5	110				
270	Woodstock	Shenandoah River (N. Fork)	16	360				
271	Warren Power Co., Front Royal, Va.	Shenandoah River (S. Fork)	11	1,200				
272	Woodstock Elec. Light & Power Co., Woodstock, Va.	Shenandoah River						Power purchased from J. I. Triplett, Woodstock, Va.
273	Chambersburg Borough, Pa.	Conococheague Creek			104	8	19	
274	Cyrus S. Johnson, Fulton County, Pa.	Great Tonoloway Creek			63	10	12	
275	Octoraro Water Co., Pa., Lower Oxford	Octoraro Creek			145	10	50	
276	Penna. Water & Power Co., Holtwood, Pa.	Susquehanna River	53	150,000	26,800	55		
277	Safe Harbor Water Power Corp., Safe Harbor, Pa.	Susquehanna River	53*	255,000†	26,090	70	30,000‡	

*Ultimate Head=55 ft.
†Ultimate H. P.=510,000.
‡Useful storage.

TABLE 5. STEAM POWER STATIONS.

Serial No.	Operating Company	Stream	Installed Plant Capacity: Kw.	Installed Plant Capacity: H. P.	Quantity of Water Used—g. p. d.: Condensing and Cooling Purposes	Quantity of Water Used—g. p. d.: Boiler Make-up	Remarks
278	Con. Gas Elec. Light and Power Co. of Baltimore, Gould Street	Patapsco River	72,000 172,000 ultimate	96,515	130,752,000* 312,000,000* ultimate	49,200 111,600 ultimate	Existing water consumption based on generation of 1,440,000 kw. hr. per day or a flat load of 60,000 kw.; condensing water 5,448,000 gal. per hr., make-up water 2,050 gal. per hr. Make-up water obtained from Baltimore City supply.
279	Pratt Street	Patapsco River	20,000	26,810	62,400,000*	72,000	Water consumption based on generation of 480,000 kw. hr. per day. Condensing water 2,600,000 gal. per hr.; make-up water 3,000 gal. per hr.; make-up water obtained from Baltimore City supply.
280	Westport	Patapsco River	165,000	221,180	459,024,000*	806,400 Max. 288,000 Min. 400,000 Assumed Average	Water consumption based on generation of 2,000,000 kw. hr. per day. Condensing water 19,126,000 gal. per hr.; make-up water 12,000 gal. per hr. (minimum) and 33,600 gal. per hr. (maximum). Make-up water obtained from Patapsco River.
281	Delmarva Power Co., Vienna	Nanticoke River	12,000	16,086	200,000*	60,000	Boiler make-up obtained from wells.
282	Easton Utilities Comm., Easton	Tred Avon River	300†	402	1,728,000	12,000	Boiler make-up obtained from wells—Steam station is standby unit. Not operated continuously.
283	Municipal Elec. Light Plant, Hagerstown	Antietam Creek	7,500	10,054	7,200,000	9,800	Boiler make-up from Antietam Creek.
284	North American Cement Corp., Security	Antietam Creek	6,000	8,042	20,160,000	24,200	Boiler make-up from Antietam Creek (evaporated).
285	Perry Point, U. S. Veterans Bureau	Susquehanna River and Mill Creek	3,000	4,000	5,000,000 from Susquehanna R.	186,000 from Mill Ck.	
286	The Potomac Edison Co., Cumberland	Potomac River	10,000	13,404	52,000,000	32,000	Boiler make-up from Cumberland City supply.
287	Security	Antietam Creek	10,000	13,404	59,600,000	372,000	Boiler make-up from Hagerstown City supply or Antietam Creek when possible.
288	Williamsport	Potomac River	45,000	60,322	124,800,000	31,200	Boiler make-up from Potomac River (evaporated).
289	The United Railways & Elec. Co. of Baltimore, Owings Mills	Gwynns Falls	930	1,247	276,000	13,000	Boiler make-up from Gwynns Falls. 600 gallons daily used at plant for various purposes.
290	Keyser Light & Power Co., Keyser, W. Va.	Potomac River	500	670	* * *	* * * *	Standby unit—Boiler capacity 500 H. P. * * * * Make-up water from Keyser City supply. * * * Condensing and cooling water from Potomac River.
291	Northern Virginia Power Co., Millville, W. Va.	Shenandoah River	8,700	10,800	.....	.....	Standby unit—Boiler capacity 3,008 H. P.
292	Virginia Public Service Co., Alexandria, Va.	Potomac River	9,250	12,400	Not Metered*	9,600	Boiler make-up from Alexandria City supply.
293	Virginia Public Service Co., New Market, Va.	N. Fork Shenandoah River	500	670	1,500,000	18,000	Plant shut down—Available only for extreme emergency.
294	Chambersburg, Pa. (Borough of Chambersburg)	Conococheague Creek (see remarks)	3,000	4,000	2,500,000	22,000	Condensing water from Falling Spring. Boiler make-up from Birch Run. Also has steam turbine of 3,300 H. P.

*Tidewater. †Easton Utilities Comm. has an 800 Kw. Diesel Engine Generator Plant (Main Unit)

TABLE 6. DAMS FOR INDUSTRIAL USES OTHER THAN FOR WATER SUPPLY AND HYDRO-ELECTRIC POWER.

Serial No.	Location	Stream	Owner	Purpose	Remarks
295	Alberton	Patapsco River	James S. Gary & Sons, Inc.	Mill Supply.	
296	Asbestos	Patapsco River	Congoleum-Nairn, Inc.	Plant Supply.	
297	Camp Ritchie	Red Falls Ck. (Antietam Ck.)	State of Maryland	Water Supply for Camp Louise & Recreation	Maryland National Guard Camp.
298	Cumberland	Potomac River	Chesapeake & Ohio Canal Co.	Supply for Canal.	
299	Elk Mills	Big Elk Creek	Baldwin Mfg. Co.	Mill Supply.	
300	Ilchester	Patapsco River	Bartgis Bros. Co.	Mill Supply.	
301	Lake Roland	Jones Falls	Baltimore City (Bureau of Water Supply)	Abandoned Source of Water Supply	Maintained for emergency water supply or for possible future industrial purposes.
302	Luke	Potomac River	W. Va. Pulp & Paper Co.	Mill Supply	Also used as waterworks intake for Luke.
303	Oakland Mills	Patapsco River	Melville Woolen Co.	Mill Supply	
304	Oella	Patapsco River	Wm. J. Dickey & Sons	Mill Supply.	
305	Rockland	Jones Falls	Rockland Bleachery & Dye Works	Plant Supply.	
306	Savage	Little Patuxent River	Savage Mfg. Co.	Plant Supply	Dam 22′ high, power plant of 850 Kw. Capacity.
307	White Hall	Little Gunpowder Falls	White Hall Paper Mill Co.	Mill Supply	Mill not operating Jan. 1, 1932.
308	Williamsport	Conococheague Ck.	W. D. Byron & Sons Co., Inc.	Tannery Supply.	
309	Williamsport	Potomac River	The Potomac Edison Co.	Supply for Steam Gen. Plant.	
310	Paw Paw, W. Va.	Potomac River	Paw Paw Tannery	Tannery Supply.	
311	Stony River Dam, W. Va.	Stony River	W. Va. Pulp & Paper Co.	Auxiliary Plant Supply & for Control of Potomac River	Water released from dam to augment flow of Potomac River when necessary. Storage=2,000,000 Gal.

TABLE 7. SUMMARY OF USES OF SURFACE STREAMS IN VARIOUS DRAINAGE BASINS.

Serial No.	Drainage Area and Location	Owner or Operating Company	Purpose or Use	Amounts of Use—g. p. d.: Water Supply	Amounts of Use—g. p. d.: Steam Generating Station: Condensing Water	Amounts of Use—g. p. d.: Steam Generating Station: Make-up	Hydro-electric Dam: Horse Power	Amounts of Discharge g. p. d.: Trade Wastes	Amounts of Discharge g. p. d.: Sewage	Population	Drainage Area: Square Miles (at Mouth)
			1—OHIO RIVER BASIN								
	Casselman River										68.7 (at Pa. Line)
23	Frostburg	Municipality	Water Supply	400,000**						5,588z	
	Youghiogheny River										397.0 (at Pa. Line)
113	Deer Park	Municipality	Sewage Discharge						No Record	249	
146	Oakland	Municipality	Sewage Discharge						15,000#	1,662	
253	Nr. Friendsville	Youghiogheny Hydro-electric Corp.	Hydro-electric Plant				24,000				
			Total	400,000			24,000		15,000	1,911	
			2—POTOMAC RIVER BASIN								
	Potomac River										14,669
29	Kempton	Davis Coal and Coke Company	Water Supply (Auxiliary)	125,000						500	—
311	**Stony River** Stony River Dam	West Virginia Pulp & Paper Company	Auxiliary Plant Supply and for Control of Potomac River								116
	Savage River										
22	Frostburg	Municipality	Water Supply	400,000						5,588z	
52	Westernport	Municipality	Water Supply	450,000						3,340z	
40	Piedmont, W. Va	Municipality	Water Supply	240,000						2,241z	
	Potomac River										
35	Luke	West Virginia Pulp & Paper Company	Water Supply	175,000						1,064	
302	Luke	West Virginia Pulp & Paper Company	Mill Supply					8,000,000			
222	Luke	West Virginia Pulp & Paper Company	Industrial Waste Discharge								73.9
	Georges Creek										
126	Frostburg	Municipality	Sewage Discharge						400,000#	5,588z	
34	Lord	The Consolidation Coal Company	Water Supply	5,000						60	
36	Midland	Municipality	Water Supply	50,000						865z	
142	Midland	Municipality	Sewage Discharge						50,000#	865z	
32	Lonaconing	Lonaconing Water Company	Water Supply	} 200,000						} 2,508	
33	Lonaconing	Lonaconing Water Company	Water Supply						200,000#	2,508	
138	Lonaconing	Municipality	Sewage Discharge							689z	
5	Barton	Barton Water and Electric Company	Water Supply	20,000						689z	
98	Barton	Municipality	Sewage Discharge						20,000		
	Potomac River										
139	Luke	Municipality	Sewage Discharge						175,000#	1,064	
168	Westernport	Municipality	Sewage Discharge						450,000#	3,440z	
178	Piedmont, W. Va	Municipality	Sewage Discharge						240,000#	2,241z	
290	Keyser, W. Va	Keyser Light and Power Company	Steam Power Station		No record	No record					
	New Creek										
56	Keyser, W. Va	Municipality	Water Supply	650,000						6,048z	
	Potomac River										
174	Keyser, W. Va	Municipality	Sewage Discharge						650,000#	6,048z	
210	Cumberland	Celanese Corporation of America	Industrial Waste Discharge					13,000,000			
211	Cumberland	Kelly-Springfield Tire Company	Industrial Waste Discharge					30,000,000¶			
	Wills Creek										254
80	Hyndman, Pa.	Hyndman Water Company	Water Supply (Emergency Intake on Little Wills Creek)	80,000						1,200±	
202	Hyndman, Pa.	Municipality	Sewage Discharge						50,000°	1,200±	
6	Barrellville	Cumberland Coal Company	Water Supply	5,000						200	
286	Cumberland	The Potomac Edison Company	Steam Power Station		52,000,000	32,000					
	Potomac River										
212	Cumberland	Union Tanning Company	Industrial Waste Discharge					118,500			
213	Cumberland	Cumberland Laundry Company	Industrial Waste Discharge					25,000			
214	Cumberland	N. & G. Taylor Company	Industrial Waste Discharge					100,000			
298	Cumberland	Chesapeake & Ohio Canal Company	Supply for Canal						7,000,000#	39,483	
112	Cumberland	Municipality	Sewage Discharge						38,000#	1,972z	
179	Ridgeley, W. Va	Municipality	Sewage Discharge								

TABLE 7—Continued.

Serial No.	Drainage Area and Location	Owner or Operating Company	Purpose or Use	Amounts of Use—g. p. d. Water Supply.	Steam Generating Station Condensing Water	Steam Generating Station Make-up	Hydro-electric Dam Horse Power	Amounts of Discharge g. p. d. Trade Wastes	Amounts of Discharge g. p. d. Sewage	Population	Drainage Area Square Miles (at Mouth)
	Evitts Creek										94.0
75	Centerville, Pa.	Centerville Water Association	Water Supply	6,000						175z	
12	Cumberland	Municipality (Evitts Creek Water Company)	Water Supply	7,000,000						39,483	
11	Cumberland	Municipality (Evitts Creek Water Company)	Water Supply								
	Potomac River										
228	Greenspring, W. Va	Baltimore & Ohio R. R. Tie Treatment Plant	Industrial Waste Discharge					None			
	Potomac (Sonth Branch)										
55	Franklin, W. Va	Municipality	Water Supply	50,000						431z	
172	Franklin, W. Va	Municipality	Sewage Discharge						50,000#	431z	
254	Petersburg, W. Va	Community Power Company	Hydro-electric Plant				565				
58	Petersburg, W. Va	Municipality	Water Supply (Infiltration Crib in Creek Bank)	70,000						1,410z	
233	Petersburg, W. Va	Union Tanning Company	Industrial Waste Discharge					28,320			
177	Petersburg W. Va	Municipality	Sewage Discharge						70,000#	1,410z	
	Potomac (South Branch) South Fork										
57	Moorefield, W. Va	Municipality	Water Supply	60,000						734z	
231	Moorefield, W. Va	Union Tanning Company	Industrial Waste Discharge					16,148			
176	Moorefield, W. Va	Municipality	Sewage Discharge						60,000#	734z	
	Potomac (South Branch)										
59	Romney, W. Va	Municipality	Water Supply	60,000						1,441z	
180	Romney, W. Va	Municipality	Sewage Discharge						60,000#	1,441z	
	Potomac River										
310	Paw Paw, W. Va	Paw Paw Tannery	Tannery Supply								
232	Paw Paw, W. Va	Paw Paw Tannery	Industrial Waste Discharge					100,000			
	Great Cacapon River										—
256	Great Cacapon, W. Va	Northern Virginia Power Company	Hydro-electric Plant				1,120				
	Little Tonoloway Creek										—
27	Hancock	Municipality	Water Supply	150,000						947z	
	Potomac River										
131	Hancock	Municipality	Sewage Discharge						150,000#	947z	
	Warm Spring Run										—
170	Berkeley Springs, W. Va	Municipality	Sewage Discharge						100,000#	1,039z	
	Tonoloway Creek										25.9
274	Fulton County, Pa	Cyrus S. Johnson	Hydro-electric Plant				No Record				
	Black Creek										—
234	Gore, W. Va		Sand Washing Plant					No Record			
	Potomac River										
258	Hedgesville, W. Va	Potomac Light & Power Company	Hydro-electric Plant				1,120				
24	Hagerstown	Municipality (including Williamsport and Funkstown)	Water Supply	3,300,000						34,003	
	Conococheagne Creek										563
76	Chambersburg, Pa	Municipality	Water Supply	1,500,000						13,800±	
204	Mt. Alto, Pa	Pennsylvania State Sanatorium	Sewage Discharge						150,000°	1,000±	
78	Fayetteville, Pa	Fayetteville Water Company	Water Supply	45,000						600z	
294	Chambersburg, Pa	Borough of Chambersburg	Steam Generating Plant		2,500,000	22,000					
200	Chambersburg, Pa	Borough of Chambersburg	Sewage Discharge						1,000,000°	13,800±	
273	Chambersburg, Pa	Borough of Chambersburg	Hydro-electric Plant								
243	Chambersburg, Pa	Chambersburg Gas Co.	Industrial Waste Discharge					No Record			
82	Mercersburg, Pa	Mercersburg Water Company	Water Supply	200,000						1,700z	
246	Mercersburg, Pa	W. D. Byron & Sons Co., Inc.	Industrial Waste Discharge					No Record			
308	Williamsport	W. D. Byron & Sons Co., Inc.	Tannery Supply								
227	Williamsport	W. D. Byron & Sons Co., Inc.	Industrial Waste Discharge					300,000			
288	Williamsport	The Potomac Edison Company	Steam Power Station		124,800,000	31,200					
	Potomac River										
309	Williamsport	The Potomac Edison Company	Supply for Steam Generating Plant								—
	Opequon Creek										
240	Winchester, Va	Virginia Woolen Mills	Industrial Waste Discharge					125,000			
241	Winchester, Va	Shenandoah Box Board Co.	Industrial Waste Discharge					No Record			
242	Winchester, Va	Winchester Woolen Mills	Industrial Waste Discharge					47,000			
198	Winchester, Va	Municipality	Sewage Discharge						800,000	10,885z	
175	Martinsburg, W. Va	Municipality	Sewage Discharge						No Record	14,857z	
230	Martinsburg, W. Va	Berkeley Woolen Mills	Industrial Waste Discharge					200,000			

TABLE 7—Continued.

Serial No.	Drainage Area and Location	Owner or Operating Company	Purpose or Use	Amounts of Use—g. p. d.: Water Supply	Steam Generating Station: Condensing Water	Steam Generating Station: Make-up	Hydro-electric Dam: Horse Power	Amounts of Discharge g. p. d.: Trade Wastes	Amounts of Discharge g. p. d.: Sewage	Population	Drainage Area: Square Miles (at Mouth)
	Potomac River										
259	Shepherdstown, W. Va.	Potomac Light & Power Company	Hydro-electric Plant				1,000				
60	Shepherdstown, W. Va.	Municipality	Water Supply	150,000						1,888z	
181	Shepherdstown, W. Va.	Municipality	Sewage Discharge						150,000#	1,888z	
	Antietam Creek										292
9	Camp Louise	Daughters of Israel	Water Supply (Summer Camp)	25,000							
297	Camp Ritchie	State of Maryland (Md. National Guard Camp)	Water Supply for Camp Louise and Recreation								
104	Camp Ritchie and Camp Louise	State of Maryland (Md. National Guard Camp), Daughters of Israel	Sewage Discharge						160,000	1,200	
85	Rouzerville, Pa.	Rouzerville Water Company	Water Supply	48,000						1,500z	
86	Waynesboro, Pa.	Municipality	Water Supply	1,000,000						9,700±	
248	Waynesboro, Pa.	Waynesboro Gas Company	Industrial Waste Discharge					No Record			
83	Mt. Alto, Pa.	Pennsylvania State Sanatorium	Water Supply	137,000						1,000±	
	Antietam Creek										292
205	Waynesboro, Pa.	Municipality	Sewage Discharge						1,400,000°	9,700±	
25	Hagerstown	Municipality (including Smithsburg)	Water Supply	} 1,200,000							
26	Hagerstown	Municipality	Water Supply							32,076	
287	Security	The Potomac Edison Company	Steam Power Station		59,600,000	372,000					
284	Security	North American Cement Corporation	Steam Power Station		20,160,000	24,200					
162	Security	Municipality	Sewage Discharge						25,000#	329	
283	Hagerstown	Municipal Electric Light Plant	Steam Power Station		7,200,000	9,800					
130	Hagerstown	Municipality	Sewage Discharge						2,500,000	31,475	
158	Roxbury	Maryland State Penal Farm	Sewage Discharge						See Table 2	75	
251	Boonsboro	Maryland Light & Power Company	Hydro-electric Plant				360				
	Potomac River										
255	Harpers Ferry, W. Va.	Harpers Ferry Electric Light & Power Co.	Hydro-electric Plant				1,022				
	Shenandoah (South Fork)										—
197	Waynesboro, Va.	Municipality	Sewage Discharge						200,000x	6,226z	
236	Waynesboro, Va.	Crompton Shenandoah Co.	Industrial Waste Discharge					300,000±			
237	Waynesboro, Va.	Dupont Rayon Co.	Industrial Waste Discharge					500,000±			
238	Waynesboro, Va.	Edison General Elec. Co.	Industrial Waste Discharge					No Record			
239	Waynesboro, Va.	Stehlis Silk Mills	Industrial Waste Discharge					No Record			
266	Grottoes, Va.	Virginia Public Service Company	Hydro-electric Plant				420				
196	Staunton, Va.	Municipality	Sewage Discharge						650,000x	11,990z	
72	Staunton, Va.	Municipality	Water Supply	1,300,000†						11,990z	
65	Harrisonburg, Va.	Municipality	Water Supply	600,000†						7,232z	
183	Bridgewater, Va.	Municipality	Sewage Discharge						10,000x	951z	
188	Harrisonburg, Va.	Municipality	Sewage Discharge						600,000x	7,232z	
263	Nr. Bridgewater, Va.	North River Electric Company	Hydro-electric Plant				163				
261	Harrisonburg, Va.	Municipality	Hydro-electric Plant				—				
186	Elkton, Va.	Municipality	Sewage Discharge						90,000x	965z	
70	Shenandoah, Va.	Municipality	Water Supply (Filter Plant Capacity 0.5 m. g. d.)	500,000						1,980z	
71	Shenandoah, Va.	Municipality	Water Supply (Filter Plant Capacity 1.0 m. g. d.)	1,000,000						300	
195	Shenandoah, Va.	Municipality	Sewage Discharge						500,000#	1,980z	
262	Nr. Shenandoah, Va.	Massanutten Power Corporation	Hydro-electric Plant				1,470				
264	Nr. Luray, Va.	Page Power Company	Hydro-electric Plant				2,550				
66	Luray, Va.	Municipality	Water Supply	250,000†						1,459z	
235	Luray, Va.		Industrial Waste Discharge					150,000¶			
190	Luray, Va.	Municipality	Sewage Discharge						250,000x	1,459z	
64	Front Royal, Va.	Municipality	Water Supply (Filter Plant Capacity 1.0 m. g. d.)	1,000,000						2,424z	
271	Front Royal, Va.	Warren Power Company	Hydro-electric Plant				1,200				
187	Front Royal, Va.	Municipality	Sewage Discharge						1,000,000	2,424z	
	Shenandoah (North Fork)										—
269	Timberville, Va.	Virginia Public Service Company	Hydro-electric Plant				110				
68	New Market Va.	Municipality	Water Supply	No Record						464z	
193	New Market Va.	Municipality	Sewage Discharge						No Record	464z	
293	New Market Va.	Virginia Public Service Company	Steam Power Station		1,500,000	18,000					
67	Mt. Jackson, Va.	Municipality	Water Supply	40,000†						554z	
192	Mt. Jackson, Va.	Municipality	Sewage Discharge						40,000x	554z	
185	Edinburg, Va.	Municipality	Sewage Discharge						50,000x	498z	

Serial No.	Drainage Area and Location	Owner or Operating Company	Purpose or Use	Amounts of Use—g. p. d.: Water Supply	Steam Generating Station: Condensing Water	Steam Generating Station: Make-up	Hydro-electric Dam: Horse Power	Amounts of Discharge g. p. d.: Trade Wastes	Amounts of Discharge g. p. d.: Sewage	Population	Drainage Area: Square Miles (at Mouth)
74	Woodstock, Va.	Municipality	Water Supply	100,000†						1,552z	
265	Edinburg, Va.	Virginia Public Service Company	Hydro-electric Plant				220				
199	Woodstock, Va.	Municipality	Sewage Discharge						100,000x	1,552z	
270	Woodstock, Va.	Virginia Public Service Company	Hydro-electric Plant				360				
63	Edinburg, Va.	Municipality	Water Supply	50,000						498z	
73	Strasburg, Va.	Municipality	Water Supply	100,000†						1,901z	
	Shenandoah River										—
62	Berryville, Va.	Municipality	Water Supply	80,000†						1,094z	
171	Charlestown, W. Va.	Municipality	Sewage Discharge						275,000‡	2,434z	
229	Halltown, W. Va.	Halltown Paper Board Company	Industrial Waste Discharge					1,440,000			
291	Millville, W. Va.	Northern Virginia Power Company	Steam Power Station		—	—					
257	Millville, W. Va.	Northern Virginia Power Company	Hydro-electric Plant				1,840				
	Potomac River										
173	Harpers Ferry and Bolivar, W. Va.	Municipality	Sewage Discharge						150,000‡	1,300z	
101	Brunswick	Municipality	Sewage Discharge						500,000‡	3,671	
	Monocacy River										970
244	Gettysburg, Pa.	Gettysburg Gas Company	Industrial Waste Discharge					—			
201	Gettysburg, Pa.	Municipality	Sewage Discharge						600,000°	5,600±	
79	Gettysburg, Pa.	Gettysburg Water Company	Water Supply	500,000						5,600±	
160	Sanatorium	Maryland Tuberculosis Sanatorium	Sewage Discharge						88,000‡	600	
16	Emmitsburg	Emmitsburg Water Company	Water Supply (Auxiliary Supply)	No Record						1,300	
121	Emmitsburg	St. Joseph's Academy	Sewage Discharge						100,000‡	400	
120	Emmitsburg	Mt. St. Mary's College	Sewage Discharge						100,000‡	800	
43	Sanatorium	Maryland Tuberculosis Sanatorium	Water Supply (Auxiliary Supply)	88,000						600	
47	Thurmont	Mechanicstown Water Company	Water Supply	100,000						1,209	
18	Frederick	Municipality	Water Supply								
20	Frederick	Municipality	Water Supply (Auxiliary Supply)	1,500,000						15,173	
19	Frederick	Municipality	Water Supply								
48	Walkersville	Walkersville Water Company	Water Supply	50,000						629	
217	Frederick	Union Manufacturing Company	Industrial Waste Discharge					20,000			
125	Frederick	Municipality	Sewage Discharge						1,500,000‡	15,173	
21	Frederick	Municipality	Water Supply (Auxiliary Supply)								
	Goose Creek										—
189	Leesburg, Va.	Municipality	Sewage Discharge						No Record	1,640z	
267	Leesburg, Va.	Virginia Public Service Company	Hydro-electric Plant				800				
	Muddy Branch										19.2
127	Gaithersburg and Washington Grove	Municipality	Sewage Discharge						57,600‡	2,500	
	Potomac River										
13	Dist. of Columbia	Municipality	Water Supply	95,000,000						486,869z	
	Cabin John Creek										25.6
157	Rockville	Municipality	Sewage Discharge						90,000	1,483	
	Anacostia River										170
49	Burnt Mills	Washington Suburban Sanitary Commission	Water Supply								
51	Takoma Park	Washington Suburban Sanitary Commission	Water Supply (In Reserve)	4,000,000						60,000	
50	Hyattsville	Washington Suburban Sanitary Commission	Water Supply								
167	W. S. S. D.	Washington Suburban Sanitary Commission	Sewage Discharge						4,000,000‡	60,000	
	Potomac River										
116	Dist. of Columbia	Municipality	Sewage Discharge						95,000,000‡	486,869z	
292	Alexandria, Va.	Virginia Public Service Company	Steam Power Station		Not Metered	9,600					
	Holmes Run										—
61	Alexandria, Va.	Municipality	Water Supply (Filter Plant Capacity=3.0 m. g. d.)	3,000,000						24,149z	
	Potomac River										
182	Alexandria, Va.	Municipality	Sewage Discharge						3,000,000‡	24,149z	
	Bull Run										—
191	Manassas, Va.	Municipality	Sewage Discharge						No Record	1,215z	
260	Manassas, Va.	Bull Run Power Company	Hydro-electric Plant				272				
	Potomac River										
194	Quantico, Va.	U. S. Marine Corps	Sewage Discharge						2,000,000‡	3,000z	
	Chopawamsic Creek										—
69	Quantico, Va.	U. S. Marine Corps	Water Supply (Filter Plant Capacity=2.0 m. g. d.)	2,000,000						3,000z	
	Potomac River										
184	Colonial Beach, Va.	Municipality	Sewage Discharge						50,000	721z	
			Total	128,659,000	267,760,000	518,800	14,682	54,469,968	127,448,600	815,928	

Serial No.	Drainage Area and Location	Owner or Operating Company	Purpose or Use	Amounts of Use—g. p. d.: Water Supply	Steam Generating Station: Condensing Water	Steam Generating Station: Make-up	Hydro-electric Dam: Horse Power	Amounts of Discharge g. p. d.: Trade Wastes	Amounts of Discharge g. p. d.: Sewage	Population	Drainage Area: Square Miles (at Mouth)
			3—SUSQUEHANNA RIVER BASIN								
	Susquehanna River										27,469.0
277	Safe Harbor, Pa.	Safe Harbor Water Power Corporation	Hydro-electric Plant				255,000◊				
276	Holtwood, Pa.	Pennsylvania Water & Power Company	Hydro-electric Plant				150,000				
10	Conowingo	Susquehanna Power Company	Water Supply	10,000						300	
252	Conowingo	Susquehanna Power Company	Hydro-electric Plant				378,000				
109	Conowingo	Susquehanna Power Company	Sewage Discharge						20,000♯	300	
	Octoraro Creek										210.0
84	Parkesburg Borough, Pa.	Parkesburg Water Company	Water Supply	78,000						2,300	
77	Colerain Township, Pa.	Octoraro Water Company	Water Supply	}						No Record	
81	Lower Oxford, Pa.	Octoraro Water Company	Water Supply	2,000,000						2,600±	
203	Lower Oxford, Pa.	Municipality	Sewage Discharge						20,000°	2,600±	
275	Lower Oxford, Pa.	Octoraro Water Company	Hydro-electric Plant				—				
	Susquehanna River										
41	Port Deposit	Municipality	Water Supply	100,000						963z	
152	Port Deposit	Municipality	Sewage Discharge						100,000♯	963z	
28	Havre de Grace	Municipality	Water Supply	300,000						3,985z	
132	Havre de Grace	Municipality	Sewage Discharge						300,000♯	3,985z	
			Total	2,488,000			783,000		440,000	7,548	
			4—CHESAPEAKE BAY BASIN—WESTERN SHORE								
	Swan Creek										26.5
87	Aberdeen	Municipality	Sewage Discharge						100,000	1,278	
88	Aberdeen Proving Grounds	U. S. Army	Sewage Discharge (Army Post)						250,000	500	
	Gunpowder River										472.0
219	Freeland Station	James Lowe & Sons	Industrial Waste Discharge					229,000±			
218	Freeland Station	Bentley Paper Mills, Inc.	Industrial Waste Discharge					229,000±			
307	White Hall	White Hall Paper Mill Company	Mill Supply								
3	Prettyboy	Baltimore City	Water Supply	—						—	
220	Glyndon	Glyndon Laundry	Industrial Waste Discharge					30,000			
2	Loch Raven	Baltimore City (including B. C. M. D.)	Water Supply	116,000,000						875,470	
97	Towson	Eudowood Sanatorium	Sewage Discharge						30,000	250	
137	Loch Raven	Maryland Training School for Boys	Sewage Discharge						65,000♯	400	
	Middle River										—
141	Middle River	Glenn L. Martin Airplane Factory	Sewage Discharge						15,000	1,000	
	Back River										62.4
94	Overlea	Baltimore County Metropolitan Commission	Sewage Discharge						1,500,000	—	
90	Back R. Sewage Plant	Baltimore City	Sewage Discharge						62,000,000	820,470	
	Patapsco R. (North Branch)										171.0
53	Westminster	Consolidated Public Utilities Company	Water Supply	400,000						4,670	
54	Woodensburg	Montrose School for Girls	Water Supply	20,000						125	
169	Woodensburg	Montrose School for Girls	Sewage Discharge						20,000♯	125	
296	Asbestos	Congoleum-Nairn Company	Plant Supply								
209	Asbestos	Congoleum-Nairn Company	Industrial Waste Discharge					Negligible			
143	Mt. Pleasant	Mt. Pleasant Sanatorium	Sewage Discharge						15,000	125	
303	Oakland Mills	Melville Woolen Company	Mill Supply								
223	Oakland Mills	Melville Woolen Company	Industrial Waste Discharge					40,000	3,600	200	
	Patapsco R. (South Branch)										85.7
133	Henryton	Maryland Tuberculosis Sanatorium	Sewage Discharge						34,000♯	165	
46	Sykesville	Springfield State Hospital	Water Supply	500,000						2,800	
165	Sykesville	Springfield State Hospital	Sewage Discharge						470,000♯	2,800	
	Patapsco River										611.0
295	Alberton	James S. Gary & Sons, Inc.	Mill Supply								
304	Oella	Wm. J. Dickey & Sons	Mill Supply								
224	Oella	Wm. J. Dickey & Sons	Industrial Waste Discharge					250,000			
15	Ellicott City	Ellicott City Water Company	Water Supply	90,000						1,216z	
300	Ilchester	Bartgis Brothers Co.	Mill Supply								
221	Ilchester	Bartgis Brothers Co.	Industrial Waste Discharge					3,600,000			
249	Avalon	Consolidated Gas Elec. Light & Power Co.	Hydro-electric Plant				1,000				
4	Avalon	Baltimore City	Water Supply	—						—	
93	Halethorpe	Baltimore County Metropolitan Commission	Sewage Discharge						2,035,000	14,000	
135	Linthicum	Anne Arundel County Sanitary Commission	Sewage Discharge						8,000	200	
145	North Linthicum	Anne Arundel County Sanitary Commission	Sewage Discharge						10,000°	225	
136	Linthicum, Shipley and Overlook	Anne Arundel County Sanitary Commission	Sewage Discharge						49,000	1,225	

Serial No.	Drainage Area and Location	Owner or Operating Company	Purpose or Use	Amounts of Use—g. p. d.: Water Supply	Steam Generating Station: Condensing Water	Steam Generating Station: Make-up	Hydro-electric Dam: Horse Power	Amounts of Discharge g. p. d.: Trade Wastes	Amounts of Discharge g. p. d.: Sewage	Population	Drainage Area: Square Miles (at Mouth)
	Gwynns Falls										65.5
37	Owings Mills	Rosewood State Training School	Water Supply	150,000						1,100	
289	Owings Mills	The United Railways & Elec. Co. of Baltimore	Steam Power Station		276,000	13,000					
148	Owings Mills	Rosewood State Training School	Sewage Discharge						150,000♯	1,100	
140	McDonogh	McDonogh School	Sewage Discharge						80,000	350	
144	Mt. Wilson	Maryland Tuberculosis Sanatorium	Sewage Discharge						27,000♯	220	
216	Franklintown	Franklintown Laundry Company	Industrial Waste Discharge					14,000			
	Jones Falls										59.0
305	Rockland	Rockland Bleachery & Dye Works	Plant Supply								
226	Rockland	Rockland Bleachery & Dye Works	Industrial Waste Discharge					40,000			
96	Towson	Baltimore County Metropolitan Commission	Sewage Discharge						500,000	6,000	
301	Lake Roland	Baltimore City	Abandoned Source of Water Supply								
	Patapsco River										611.0
280	Westport, Baltimore City	Consolidated Gas Elec. Light & Power Co.	Steam Power Station		459,024,000‡	400,000					
278	Gould St., Baltimore City	Consolidated Gas Elec. Light & Power Co.	Steam Power Station		130,752,000‡ 312,000,000 ultimate	49,200 111,600 ultimate					
279	Pratt St., Baltimore City	Consolidated Gas Elec. Light & Power Co.	Steam Power Station		62,400,000‡	72,000					
105	Camp Holabird	U. S. Army	Sewage Discharge (Army Post)						No Record	—	
91	Curtis Bay	Baltimore City	Sewage Discharge						72,000	533°	
	Curtis Creek										35.7
128	Glenburnie	Anne Arundel County Sanitary Commission	Sewage Discharge						40,000	1,000	
	Patapsco River										
92	Dundalk	Bethlehem Steel Company	Sewage Discharge						400,000	6,500	
95	Sparrows Point	Bethlehem Steel Company	Sewage Discharge						1,000,000	10,000	
	Severn River										68.9
45	Sherwood Forest	Sherwood Forest Company	Water Supply—mostly summer resort	100,000						500	
89	Annapolis & Naval Academy	Municipality	Sewage Discharge						2,500,000	12,820	
119	Eastport	Municipality	Sewage Discharge						37,000	1,468	
	South River										66.1
111	Crownsville	Crownsville State Hospital	Sewage Discharge						150,000♯	1,100	
1	Annapolis	Annapolis Water Company	Water Supply	1,500,000						12,820	
	Chesapeake Bay										
107	Chesapeake Beach	Municipality	Sewage Discharge (Summer Resort)						15,000♯	Sum. Res.	
	Little Patuxent River										161.0
44	Savage	Savage Manufacturing Company	Water Supply	20,000						1,000	
306	Savage	Savage Manufacturing Company	Plant Supply								
161	Savage	Savage Manufacturing Company	Sewage Discharge						20,000♯	1,000	
8	Bridewell	Maryland House of Correction	Auxiliary Water Supply	Auxiliary						1,400	
7	Bridewell	Maryland House of Correction	Water Supply	200,000						1,400	
100	Bridewell	Maryland House of Correction	Sewage Discharge						200,000	1,400	
17	Fort Geo. G. Meade	U. S. Army	Water Supply (9 Mos.=500,000, 3 Mos.=1,800,000=827,671 Average)	827,671							
124	Fort Geo. G. Meade	U. S. Army	Sewage Discharge (Army Post)						736,627	1,500—9 Mos. 5,000—3 Mos.	
	Patuxent River										932.0
250	Laurel	Maryland Realty Co. of Baltimore	Hydro-electric Plant (Inoperative since 1909)				Unknown				
134	Laurel	Municipality	Sewage Discharge						280,000♯	2,596	
30	Laurel	Municipality	Water Supply	280,000						2,596	
			Total	120,087,671	652,452,000	534,200	1,000	4,432,000	72,812,227	928,153	
			5—CHESAPEAKE BAY BASIN—EASTERN SHORE								
	Mill Creek										—
38	Perry Point	U. S. Veterans Bureau Hospital	Water Supply	600,000						1,800	
39	Perryville	Perryville Water Company	Water Supply	50,000						715	
285	Perry Point	U. S. Veterans Bureau Hospital	Steam Power Station		5,000,000§	186,000£					
	Chesapeake Bay										
149	Perryville	Municipality	Sewage Discharge						50,000♯	715	
150	Perry Point	U. S. Veterans Bureau Hospital	Sewage Discharge						600,000♯	1,800	
	Elk River										267.0
203	Lower Oxford, Pa	Municipality	Sewage Discharge						20,000	2,600±	
245	Lower Oxford, Pa	Oxford Steam Laundry	Industrial Waste Discharge					18,000			

TABLE 7—Continued.

Serial No.	Drainage Area and Location	Owner or Operating Company	Purpose or Use	Amounts of Use—g. p. d. Water Supply	Steam Generating Station Condensing Water	Steam Generating Station Make-up	Hydro-electric Dam Horse Power	Amounts of Discharge g. p. d. Trade Wastes	Amounts of Discharge g. p. d. Sewage	Population	Drainage Area Square Miles (at Mouth)
299	Elk Mills	Baldwin Manufacturing Company	Mill Supply								
215	Elk Mills	Baldwin Manufacturing Company	Industrial Waste Discharge					40,000			
14	Elkton	Municipality	Water Supply	250,000						3,478	
122	Elkton	Municipality	Sewage Discharge						250,000♯	3,478	
	Little Elk Creek										41.9
203	Lower Oxford, Pa	Municipality	Sewage Discharge						20,000	2,600±	
247	Lower Oxford, Pa	Citizens Gas & Fuel Co.	Gas Manufacture—Waste Discharge					No Record			
225	Providence	Jessup & Moore Paper Co., Kenmore Mills	Industrial Waste Discharge					Save-all	150		
	Sassafras River										104.0
99	Betterton	Municipality	Sewage Discharge—Summer Resort						No Record	296z	
	Chesapeake Bay										
166	Tolchester Beach	Summer Resort	Sewage Discharge						No Record	Sum. Res.	
	Chester River										446.0
108	Chestertown	Municipality	Sewage Discharge						30,000	2,869	
	Corsica River										36.3
106	Centerville	Municipality	Sewage Discharge						162,000♯	1,291z	
	Miles River										54.4
164	St. Michaels	Municipality	Sewage Discharge						75,000♯	1,308z	
	Tred Avon River										45.8
282	Easton	Easton Utilities Commission	Steam Power Station		1,728,000	12,000					
117	Easton	Municipality	Sewage Discharge—North Plant						250,000 }	4,235	
118	Easton	Municipality	Sewage Discharge—South Plant						425,000 }		
	Choptank River										795.0
129	Greenshoro	Municipality	Sewage Discharge						50,000♯	780	
156	Ridgely	Municipality	Sewage Discharge						118,000♯	703z	
115	Denton	Municipality	Sewage Discharge						180,000♯	1,611	
153	Preston	Municipality	Sewage Discharge						70,000	315z	
103	Cambridge	Eastern Shore State Hospital	Sewage Discharge						50,000♯	350	
102	Cambridge	Municipality	Sewage Discharge						2,350,000	8,780	
	Nanticoke River										815.0
206	Bridgeville, Del.	Municipality	Sewage Discharge						90,000°	987z	
208	Seaford, Del.	Municipality	Sewage Discharge						200,000°	2,468z	
207	Laurel, Del.	Municipality	Sewage Discharge—75% Sewered						188,000°	2,277z	
123	Federalsburg	Municipality	Sewage Discharge						150,000♯	1,387	
281	Vienna	Delmarva Power Company	Steam Power Station		200,000‡	60,000					
	Wicomico River										238.0
114	Delmar	Municipality	Sewage Discharge						135,000♯	1,180z	
42	Salishury	Municipality	Emergency Water Supply	—						11,753	
159	Salisbury	Municipality	Sewage Discharge						1,000,000♯	11,753	
	Manokin River										125.0
154	Princess Anne	Municipality	Sewage Discharge						162,000♯	976	
	Little Annemessex River										—
110	Crisfield	Municipality	Sewage Discharge						216,000♯	3,850z	
	Pocomoke River										488.0
163	Snow Hill	Municipality	Sewage Discharge						216,000♯	1,604z	
151	Pocomoke City	Municipality	Sewage Discharge						150,000♯	2,645	
			Total	900,000	6,928,000	258,000		58,000	7,207,150	60,258	
			6—ATLANTIC COAST								
	Sinepuxent Bay										
147	Ocean City	Municipality	Sewage Discharge						335,000♯	998	
	Chincoteague Bay										
155	Puhlic Landing	Municipality	Sewage Discharge						No Record	250	
			Total						335,000	1,248	
			Grand Total	252,134,671	927,140,000	1,311,000	822,682*	58,959,968	208.257,977	1,814,746	

‡Tidewater.
§Taken from Susquehanna River.
£Taken from Mill Creek.
◊Ultimate Horsepower=510,000.
♯Assumed same as water consumption.

°Estimated.
¶Cooling and condensing water.
z1930 Population.
**Not included in total.

†Water consumption in 1916. Taken from 1916 Potomac River Report.
*Includes 90 H. P. for dam at Rockland, Va., hut not indicated on table.
xAssumed same as water consumption in 1916. Taken from 1916 Potomac River Report.

TABLE 8. UNDERGROUND WATER SUPPLIES IN MARYLAND.

Community	Population 1932	Water Consumed g. p. d.	No. of Wells	Remarks
Aberdeen	1,278	85,000	6	4 Wells at 6"; 2 at 12"
Aberdeen Proving Grounds	500	400,000	5	Softening
Annapolis	12,820	1,500,000	2	Layne-Atlantic Wells
Barton	689	50,000	1	Also Stream
Bel Air	1,773	45,000	3	Also Springs
Berlin	1,505	120,000	1	Kelly Well
Blue Ridge Summit	500	100,000	4	3 Auxiliary Wells
Boonsboro	894†	40,000	..	Springs
Braddock Heights	674	10,000	..	4 Springs
Brunswick	3,671	500,000	1	Also Springs
Burkittsville	173	4,000	..	Spring
Cambridge	8,780	2,500,000	6	1-12" at 380', 1-10" at 382', 1-10" at 372', 1-10" at 380', 2-10" at 380'
Cardiff	72	3,000	2	Wells in Delta, Pa.
Centerville	1,291	162,000	2	
Chesapeake Beach	Sum. Res.	15,000	9	Artesian Wells
Chestertown	2,869	86,000	2	Kelly Wells
Crisfield	3,850	216,000	2	
Delmar	1,180	135,000	6	3 at 4½", 24', 25' and 26' deep; 1 at 3", 85' deep; 2 at 6", 25' and 35' deep
Denton	1,611	180,000	3	1 Well 8" diam., 310' deep; 2 at 6", 300' deep
East New Market	222	12,000	1	4" Well at 290' deep (30' of 6")
Easton	4,235	360,000	4	1 at 1100', 1 at 120' deep
Elkton	3,413	250,000	..	Spring—Stream is Auxiliary Supply
Ellicott City	1,216	90,000	2	Auxiliary Supply
Emmitsburg	1,300	100,000	2	4 Springs
Federalsburg	1,379	150,000	2	Lime Treatment
Friendsville	513	25,000	..	2 Springs
Frostburg	5,588	400,000	6	Auxiliary Supply
Gaithersburg	1,142	57,600	3	
Gibson Island	Sum. Res.	75,000	1	
Glenburnie	1,000	50,000	1	
Greensboro	780	50,000	2	8" Wells, 365' deep
Hurlock	765	72,000	15	2" diameter, 50' deep
Indian Head	1,240	8,000	9	Supply of U. S. Navy Ordnance Depot
La Plata	339	14,000	1	665' deep
La Vale	1,000	100,000	1	Deep Well, 3 Springs
Leonardtown	728	90,000	1	1 Auxiliary Well at Ice Plant
Loch Lynn*	198	10,000	..	6 Springs*
Matapeake (Ferry Supply)		20,000	1	6" Well, 640' deep (6" to 400' deep)
Midland	865	50,000	2	Artesian Wells—8" at 90' deep 6" at 208' deep
Lonaconing	2,508	200,000	..	
Middletown	833	50,000	..	17 Springs
Mt. Airy	883	75,000	2	107' Wells
Mt. Lake Park	342	100,000	..	6 Springs*
New Windsor	503	20,000	..	1 Spring
Oakland	1,662	15,000	4	Also 1 Spring
Oakland Mills	500	20,000	..	3 Springs
Ocean City	998	135,000‡ 540,000§	9	3 at Plant No. 1, 6 at Plant No. 2
Overlook	440	110,000	1	
Oxford	915	60,000	1	6" Well, 680' deep
Pen Mar	2,000	20,000	..	Spring and Stream
Pocomoke City	2,645	150,000	6	5 Shallow Kelly Wells; 1 at 130'; CO_2 Removal

*Joint supply with Mt. Lake Park. †1930 Population. ‡Winter. §Summer.

TABLE 8. UNDERGROUND WATER SUPPLIES IN MARYLAND—Continued.

Community	Population 1932	Water Consumed g. p. d.	No. of Wells	Remarks
Preston	315	70,000	2	4″ diam., 67′ and 68′ deep
Princess Anne	976	162,000	1	Kelly Well—CO_2 Removal
Ridgely	703	118,000	6	3″ Wells, 65′ deep
Rising Sun	592	25,000	4	
Rock Hall	745	2,000	1	4″ diameter, 125′ deep
Rockville	1,483	100,000	6	2 Ice Plant Wells for Auxiliary
St. Michaels	1,308	75,000	2	6″ diameter, 385′ deep
Salisbury	11,753	800,000	5	
Savage	1,000	20,000	1	Also Little Patuxent River
Security	329	25,000	1	
Severna Park	500	15,000	1	Artesian Well, also 1 Spring
Snow Hill	1,604	216,000	2	6″ diameter, 375′ deep
Sparrows Point	5,000	1,360,000	9	
Taneytown	955	110,000	4	
Thurmont	1,209	100,000	..	3 Springs
Trappe	226	20,000	1	6″ diameter, 415′ deep
Union Bridge	862	50,000	1	5 Abandoned Wells
Walkersville	629	50,000	1	4 Springs; Well is Auxiliary
Wardour	100	31,200	1	
Willoughby Beach	Sum.Res.	11,000	..	2 Springs
Total	114,571	12,854,800		
Institution				
Bowie Normal School	130	12,000	2	Also 1 Spring
Charlotte Hall School	108	20,000	..	5 Springs (Swimming pool at school)
Cheltenham	400	20,000	1	Also 3 Springs
Crownsville State Hospital	1,000	125,000	3	2 used as Auxiliary
District Training School	410	100,000	3	1-8″, 1-10″, 1-24 to.36″ Layne-Atlantic
Eastern Shore State Hospital	350	50,000	2	6″ diameter, 410′ deep
Maryland Tuberculosis Sanatorium	600	88,000	4	Wells used as Auxiliary
Mt. Pleasant Sanatorium	100	14,000	3	Also 3 Springs
Mt. St. Mary's, Emmitsburg	600	100,000	1	4 Springs—Well is Auxiliary
Preventorium, Claiborne	150	20,000	1	3″ diameter, 365′ deep
Rosewood State Training School	1,150	220,000	1	40,000 g. p. d. from Well
St. Mary's Female Seminary	63	1,000	1	Artesian Well
St. James School, Hagerstown	75	10,000	..	Spring
St. Joseph's College, Emmitsburg	600	100,000	3	Deep Wells
Strawbridge Home for Boys	55	2,500	1	
Tome Institute	200	75,000	2	Deep Wells; also Springs
Total	5,991	957,500		
Grand Total	120,562	13,812,300		

TABLE 9. SUMMARY OF USES OF SURFACE AND UNDERGROUND WATERS.

Use	Number			Extent of Use in g. p. d.		
	In Maryland	On streams contributing to Maryland	Total	In Maryland	On streams contributing to Maryland	Total
Surface Water Supplies	53†	32	85	235,480,671‡	16,654,000	252,134,671
Points of Sewage Discharge	83	39	122	193,336,977	14,921,000	208,257,977
Points of Industrial Waste	19	21	40	56,035,500	2,924,468	58,959,968
Steam Power Stations	12	5	17	924,401,400	4,049,600	928,451,000
Underground Water Supplies	87	....	87	13,812,300	.....	13,812,300
Total	255	97	352	1,419,860,248	38,549,068	1,461,615,916
Dams for Hydro-electric Plants	5	24	29	403,360*	419,322*	822,682*
Dams for other purposes	42	15	57	.....	.....	.....

*Horsepower developed.
†Includes two Cumberland waterworks intakes on Evitts Creek and District of Columbia intake on Potomac River.
‡Includes District of Columbia and Piedmont, W. Va., water uses.

TABLE 10.

STREAM GAGING STATIONS IN MARYLAND—JANUARY 1, 1932.

Name of Stream and Location of Gaging Station	Period of Record **	Drainage Area Sq. Miles	Financed by (in cooperation with U. S. G. S.)
Antietam Creek, Sharpsburg, Md.	1897–1905, 1928–	281	State of Maryland
Conococheague Creek, Fairview, Md.	1928–	495	State of Maryland
C. & O. Canal, Cumberland, Md.	1929–		U. S. Government
*Deer Creek, Rocks, Md.	1926–	94.4	City of Baltimore
*East Branch Wicomico River, Salisbury, Md.	1929–	17.3	City of Salisbury
*Evitts Creek, Cumberland, Md.	1929–	89.0	Upper Potomac River Board
*Georges Creek, Franklin, Md.	1905–1906, 1929–	72.4	Upper Potomac River Board
†Gunpowder Falls, Loch Raven Dam.	1883–1931–	303	City of Baltimore
Licking Creek, Sylvan, Pa.	1930–	158	State of Maryland
Linganore Creek, Frederick, Md.	11/31 to 3/32	84.6	State of Maryland
*Little Gunpowder River, Laurel Brook, Md.	1926–	36.1	City of Baltimore
Monocacy River, Frederick, Md. (discontinued)	1896–1930	665	State of Maryland
*Monocacy River, Jug Bridge, Md.	1929–	817	State of Maryland
*North Branch Patapsco River, Marriottsville, Md.	1929–	165	City of Baltimore
*North Branch Patapsco River, Reisterstown, Md.	1927–	91.0	City of Baltimore
*North Branch Potomac River, Bloomington, Md.	1924–1927, 1929–	287	Upper Potomac River Board
*North Branch Potomac River, Cumberland, Md.	1929–	875	U. S. Government
Northwest Branch Anacostia River, Colesville, Md.	1924–	21.3	Wash. Sub. San. Comm.
*Owens Creek, Lantz, Md.	1931–	5.99	State of Maryland
*Patuxent River, Burtonsville, Md.	1911–1912, 1913–	127	Wash. Sub. San. Comm.
*Piney Run, Sykesville, Md.	1931–	11.4	State of Maryland
*Potomac River, Point of Rocks, Md.	1895–	9,650	State of Virginia
*Potomac River, Shepherdstown, W. Va.	1928–	5,940	U. S. Government
*Potomac River, Washington, D. C.	1930–	11,570	U. S. Government
*Rock Creek, Q St., Washington, D. C.	1929–1930, 1931–	75.8	Pub. Bldgs. and Pub. Parks
*Rock Creek, Sherrill Drive, Washington, D. C.	1929–	62.2	Pub. Bldgs. and Pub. Parks
*Savage River, Bloomington, Md.	1905–1906, 1924–1927, 1929–	115	Upper Potomac River Board
*Seneca Creek, Dawsonville, Md.	1930–	101	Wash. Sub. San. Comm.
Tarmans Branch, Chesterfield, Md.	1931–	8.5	State of Maryland
Town Creek, Oldtown, Md.	1928–	148	State of Maryland
*Wills Creek, Cumberland, Md.	1905–1906, 1929–	247	Upper Potomac River Board

* Recording Gage.
** Dash after date indicates gage is still in service.
† Financed by City of Baltimore only.

TABLE 10A.

ADDITIONAL STREAM GAGING STATIONS IN MARYLAND.

Name of Stream and Location of Gaging Station	Period of Record **	Drainage Area Sq. Miles	Financed by (in cooperation with U. S. G. S.)
1 Big Elk Creek, Elk Mills, Md..	April, 1932–	52.6	State of Maryland
2 Big Piney Run, Salisbury, Pa..	June, 1932–	24.5	State of Maryland
3 Broad Creek, Mill Green, Md...	1905–1909	16.4	
4 Catoctin Creek, Jefferson, Md..	1928–1931	111	
5 Deer Creek, Churchville, Md...	1905–1909	141	
6 Great Seneca Creek, Gaithersburg, Md.	1925–1931	41.0	Wash. Sub. San. Comm.
7 Gunpowder Falls, Glencoe, Md.	1905–1909	160	
8 Little Gunpowder Falls, Bel Air, Md.	1905–1909	45.0	
9 Little Patuxent River, Guilford, Md.	May, 1932–	38.0	State of Maryland
10 Northeast Branch Anacostia River, Hyattsville, Md.....	1911–1912	75.0	
11 Northwest Branch Anacostia River, Bladensburg, Md.....	1911–1913	52.0	
12 Octoraro Creek, Rising Sun, Md.	April, 1932–	191	State of Maryland
13 Octoraro Creek, Rowlandsville, Md.	1896–1899	209	
14 Patapsco River, Woodstock, Md.	1896–1909	251	
15 Patuxent River, Laurel, Md....	1896–1898	137	
16 Potomac River, Hancock, Md...	Oct., 1932–	4,070	State of Maryland and U. S. Weather Bureau
17 Youghiogheny River, Friendsville, Md.	1898–1904	298	

** Dash after date indicates gage is still in service.

TABLE 11. PRESENT AND FUTURE COMBINED USAGE OF STREAMS IN MARYLAND.

Stream	Requirements—g. p. d.			
	Public Water Supply	Industrial Supply	Steam Power Stations	Totals
Potomac and Tributaries	128,659,000	54,469,968	268,278,800	451,407,768
Patapsco and Tributaries	1,160,000	3,944,000	652,986,200	658,090,200
Patuxent and Tributaries	1,327,671	.....	.....	1,327,671
Gunpowder Falls	116,000,000	488,000	.....	116,488,000
Susquehanna	2,488,000	.....	.....	2,488,000
Other Streams	2,500,000	58,000	7,186,000	9,744,000
Total	252,234,671	58,959,968	928,451,000	1,239,545,639

TABLE 12. VARIATION OF RUN-OFF IN MARYLAND STREAMS.

Stream	Drainage Area Square Miles	Location of Gage	Length of Record Years	Flow—Million Gallons per Square Mile per 24 Hours				
				Maximum Record	Maximum Day	Average	Minimum Month	Minimum Record
Susquehanna River	24,100	Harrisburg, Pa.	38	17.8	16.44	0.955	0.094	0.062
Potomac River	9,651	Point of Rocks	35	21.7	17.27	0.632	0.047	0.036
Monocacy River	665	Ceresville	33	19.1	17.80	0.902	0.038	0.014
Gunpowder Falls	303	Loch Raven Dam	49	....	.....	0.948	0.154	.....
Patapsco River	251	Woodstock	*13	.....	28.3	0.920	0.129	.....
	91	Reisterstown	5	17.8	7.89	0.700	0.128	0.114
	165	Marriottsville	3	.....	4.65	0.470	0.098	.....
Patuxent River	127	Burtonsville	18	22.7	13.80	0.628	0.048	0.028
Seneca Creek	101	Dawsonville	1	.....	3.2	0.215	0.047	0.012
	41	Frederick Pike	5.5	12.6	9.4	0.552	0.032	0.020
Northwest Branch	21.3	Northwest Mills	8	48.5	19.4	0.614	0.022	0.012

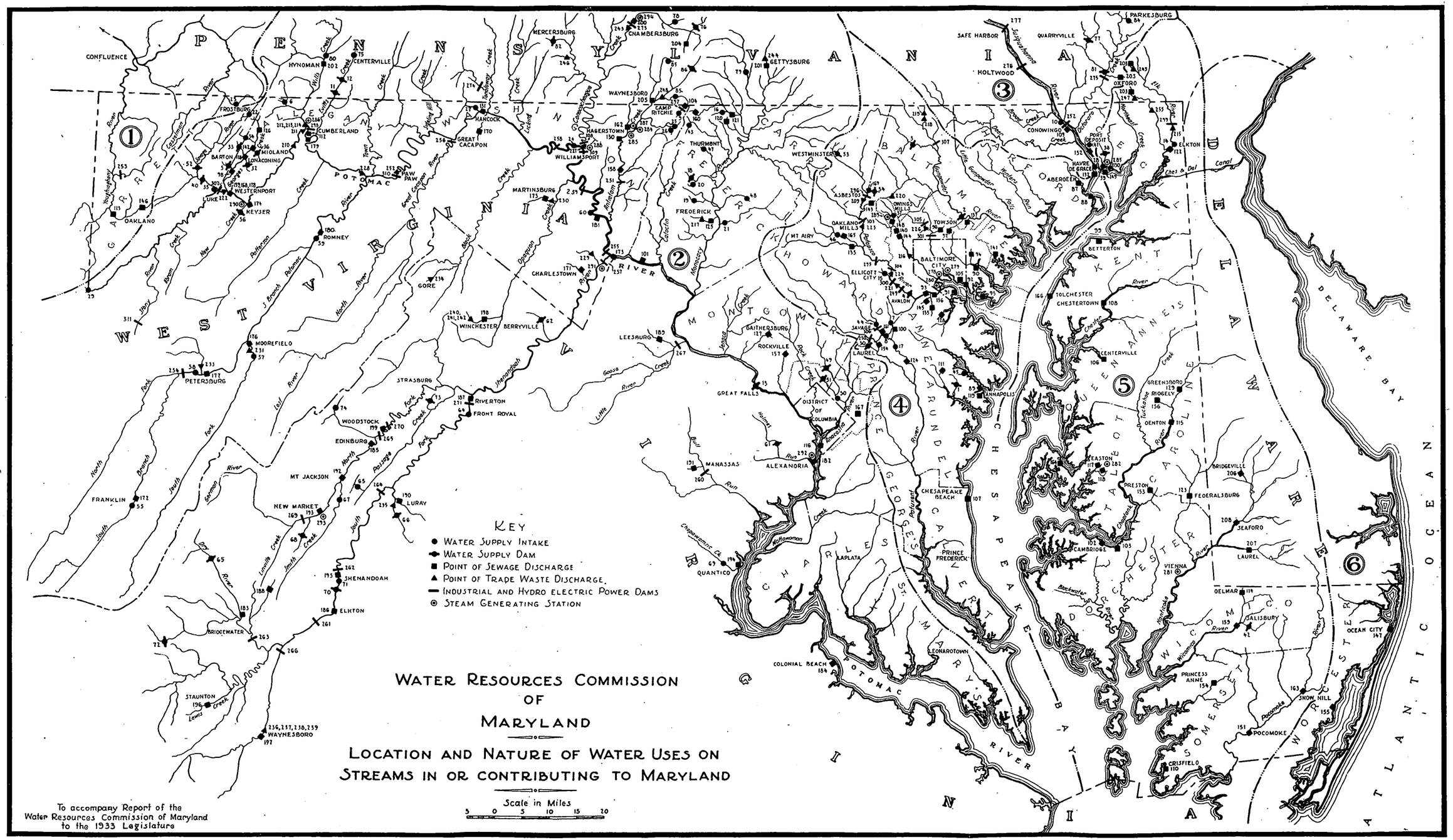
*Gage established in 1896 but records prior to 1901 are not available.

TABLE 13. VARIATION OF RUN-OFF IN MARYLAND STREAMS.

Stream	Maximum Flow Equals		Average Flow Min. Month equals Percent of Average	Minimum Flow equals Percent of Average
	Average multiplied by	Minimum multiplied by		
Susquehanna River	19	287	9.9	6.5
Potomac River	34	603	7.4	5.7
Monocacy River	21	1,364	4.2	1.6
Gunpowder Falls	...	....	6.1	...
Patapsco River at Woodstock	...	....	14.0	...
at Reisterstown	25	156	18.3	16.3
at Marriottsville	...	....	20.8	...
Patuxent River	36	811	7.6	4.5
Seneca Creek at Dawsonville	...	....	21.8	5.6
at Frederick Pike	23	630	5.8	3.6
Northwest Branch	79	4,042	3.6	2.0

APPENDIX C

MAP SHOWING LOCATION OF WATER USES ON STREAMS IN OR CONTRIBUTING TO MARYLAND.


WATER RESOURCES COMMISSION
OF
MARYLAND
LOCATION AND NATURE OF WATER USES ON
STREAMS IN OR CONTRIBUTING TO MARYLAND
KEY
WATER SUPPLY INTAKE
WATER SUPPLY DAM
POINT OF SEWAGE DISCHARGE
POINT OF TRADE WASTE DISCHARGE.
INDUSTRIAL AND HYDRO ELECTRIC POWER DAMS
STEAM GENERATING STATION
Scale in Miles
5 0 5 10 15 20
To accompany Report of the
Water Resources Commission of Maryland
to the 1933 Legislature
PENNSYLVANIA
WEST VIRGINIA
DELAWARE
ATLANTIC OCEAN
DELAWARE BAY
CHESAPEAKE BAY
POTOMAC RIVER
CONFLUENCE
FROSTBURG
HYNOMAN
CENTERVILLE
CUMBERLAND
MIDLAND
LONACONING
BARTON
LUKE
WESTERNPORT
KEYSER
OAKLAND
ROMNEY
MOOREFIELD
PETERSBURG
FRANKLIN
MT JACKSON
NEW MARKET
SHENANDOAH
ELKTON
BRIDGEWATER
STAUNTON
WAYNESBORO
STRASBURG
WOODSTOCK
EDINBURG
LURAY
FRONT ROYAL
RIVERTON
WINCHESTER
BERRYVILLE
GORE
CHARLESTOWN
MARTINSBURG
HAGERSTOWN
WILLIAMSPORT
HANCOCK
GREAT CACAPON
MERCERSBURG
CHAMBERSBURG
WAYNESBORO
CAMP RITCHIE
THURMONT
FREDERICK
GETTYSBURG
LEESBURG
MANASSAS
ALEXANDRIA
QUANTICO
COLONIAL BEACH
GREAT FALLS
ROCKVILLE
GAITHERSBURG
DISTRICT OF COLUMBIA
LAPLATA
LEONARDTOWN
PRINCE FREDERICK
CHESAPEAKE BEACH
ANNAPOLIS
LAUREL
SAVAGE
AVALON
ELLICOTT CITY
OWINGS MILLS
ASBESTOS
OAKLAND MILLS
MT AIRY
WESTMINSTER
BALTIMORE CITY
TOWSON
BETTERTON
TOLCHESTER
CHESTERTOWN
CENTERVILLE
GREENSBORO
RIDGELY
OENTON
EASTON
PRESTON
FEDERALSBURG
BRIDGEVILLE
SEAFORD
LAUREL
CAMBRIDGE
VIENNA
OELMAR
SALISBURY
PRINCESS ANNE
SNOW HILL
POCOMOKE
CRISFIELD
OCEAN CITY
ABERDEEN
HAVRE DE GRACE
PORT DEPOSIT
CONOWINGO
OXFORD
ELKTON
PARKESBURG
QUARRYVILLE
SAFE HARBOR
HOLTWOOD
Ches & Del Canal

APPENDIX D

SUMMARY OF WATER RESOURCES CONTROL IN STATES IN THE UNITED STATES.

WATER RESOURCES CONTROL IN STATES—INDICATION OF PERTINENT LEGISLATIVE AUTHORITY

(The summary below is intended to present a general picture only of the regulatory practice in the various states of the United States. It is not sufficiently detailed or comprehensive to be used for accurate reference in the case of any of the individual statutes.)

STATE	HAS A WATER RESOURCES SURVEY BEEN MADE AND A CONSERVATION PROGRAM BEEN DEVELOPED? By whom?	CENTRAL BOARD, DEPARTMENT OR OFFICIAL HAVING CONTROL OVER WATER AND WATER STRUCTURES AND DEVELOPMENT AND CONSERVATION: Name of Body, Superintendent or Official Organization	Powers, Functions, Etc.	Method and Object of Control	HYDRO-ELECTRIC POWER DEVELOPMENT: STATE CONTROL OVER AND REGULATION OF USE OF WATER FOR	WATER IMPROVEMENTS AND PROJECTS: VARIOUS DISTRICTS TO ACCOMPLISH THEM: Types of Districts and Powers	Central Supervision Over Districts	Extent of Legislation Concerning Districts	POWERS OF BOARD OF HEALTH OVER WATERS AND WATER STRUCTURES	UTILITY REGULATION OVER WATER COMPANIES AND WATER POWER CO.'S	DAM CONTROL (Reservoirs Generally Included)
ALABAMA	None	None	None	None	Uncontrolled	Drainage and Sewerage Districts only can be formed for these objects	None other than Board of Health	Complete Code concerning management, finances, powers and methods of Construction, etc.	Usual laws	Public Service Commission Usual powers	Plans need not be approved, but must be filed with Sec. of State. No provisions for inspection, supervision and ordinary alterations
ARKANSAS	No adequate survey	None other than over Hydro-Electric Power development			All power sites etc. owned by State. No power to be developed without permit of State Corporation Comm.	Drainage and general Water Improvement Districts may be formed under Court Auspices and Control	None	Detailed laws covering all phases of such districts	Doubtful	State Corporation Commission Usual powers	Plans for Power Dams need be approved by State Corp. Comm., not supervised or inspected by it. Courts permit other Dams after damages assessed
ARIZONA	State Certification Board and State Water Commissioner to plan water conservation and development	State Water Commissioner State Certification Board	Must license all uses of water, decides water rights disputes, etc. Advise concerning conservation and over all irrigation projects	Not conservation but to determine priorities to use of water. Complete control over irrigation and flood and irrigation districts	Water Commissioner's permit to take water needed. No other control. Priority and not conservation the basis	Agricultural Improvement Districts for specific waterways improvements. Electrical Districts—County and State Water Commr's control. Irrigation and Flood Control Districts	Irrigation Districts under general control of State Certification Board. Electrical Districts need approval of water commissioner	All formed after petition, election, etc. Detailed code regulating	Usual laws	Corporation Commission Usual powers, including companies supplying water for irrigation	Approval of State Water Commissioners needed to build. Inspects, supervises and can order alterations. Hears complaints concerning
CALIFORNIA	Department of Public Works to develop coordinated plan. Also State Water Commission. Water Conservation Commission, 1931 to devise new scheme	Dep't. of Finance State Water Commission	To appropriate state waters. To put in effect development plans of Dep't. of Public Works. Full control and limited permit granting power over use of water	For developing State Water Projects of all sorts. To divide the State into districts etc., and regulate them for control and conservation purposes	State Water Commission. Must approve all such projects—but no full control. Dep't of Public Works to build and manage approved State Power Projects	Conservancy Districts—County Organization. Water Districts. Metropolitan Water Districts	State Engineer and Health Engineer to approve all plans. Some supervision. General Health Dept. Control	For all sorts of water projects. Detailed Code. For irrigation and reclamation, sanitation, levee, flood and recreation purposes	Usual laws	State R. R. Commission Usual powers. Public Utility Districts may be formed	The Dept. of Public Works through the State Engineer has full powers concerning building, regulation, supervising, etc., of dams—all plans need be approved before building. Complete code
COLORADO	State Engineer to Survey	State Engineer. State divided by statute into water devisions headed by appointed division engineer. These are divided into 70 water districts run by commissioners	Full permit granting powers for all uses of water and structures. Hears disputes re water use rights	All uses of water only on his permit to appropriate. Elaborate water code concerning water rights. No provision for water development under state auspices	State Engineer grants permit to use water for power development. Priority of right to so use the basis	Waterworks Districts Internal Improvements Districts for water improvements Drainage and Irrigation Districts State Canals and Reservoirs	County organized. State Engineer overlying authority Court organization and supervision State Irrigation Dist. Comm. devises irrigation plans for whole State. Court control Built by Penitentiary Commissioners. Water distributed by Board of Land Commissioners	Water projects may be accomplished by the organizing of districts. Group projects also can be accomplished. Full code provided	Usual laws	General Statutes	Full powers concerning dams by the State Engineer (if over 10-feet in height.)
CONNECTICUT	Study made by Commission, but no legislative action as yet	State Water Commission	Control over sanitation and pollution of water only	County Courts control all matters concerning river flowage	No control or program	No districts can be formed	Individual Enterprises	Slightly Regulated	Usual laws	Public Utility Commission over such corporations Usual power	State Board of Civil Engineers and the River Commission who have full dam control powers. The Board hears all complaints re dams
DELAWARE	None	None	None	None	Uncontrolled	Limited Drainage Districts	Court controls organization	Imperfect Laws and Code	Usual laws	Partial regulation by statute	None
FLORIDA	State Geologist to survey	State Geology Dept.	Over Artesian Wells only	All wells can be dug, etc., only after plans have been approved	Uncontrolled. Full code concerning rights to water of riparian owners	Drainage Districts may be organized for all water improvement purposes	State Board of Drainage Commissioners are over all districts	Provision is complete for all water construction other than power by districts or individuals	Usual laws	None	No supervision or inspection. County Commissioners can grant 10 year license to build
GEORGIA	By the Department of Forestry and Geological Development	None	None	None	Uncontrolled	Drainage Districts only	County Organization	Fairly full. Slight legislation concerning individual rights to use of water	Usual laws	No control over water companies, but over power companies	None
IDAHO	Dept. of Reclamation	Dept. of Reclamation, State Water Reservations. Certain rivers restricted by law	Complete permit granting and supervising powers over all waters, uses and structures	Divides state into water divisions and appoints Master for each. Enforces orders through courts which compel Masters to carry them out	State Dept. of Reclamation must license, but not in furtherance of conservation. The latter is the next step to be taken	General water improvements (called drainage) and irrigation districts	State Dept. of Reclamation approves all plans and has general control over district operations	Complete code re powers, management, financing, etc., of districts	Department of Public Welfare Usual laws	Public Utility Commission Usual powers	Dams over 10-feet high must be approved by Dept. of Reclamation. All over 20-feet must be periodically inspected. Full powers
ILLINOIS	None	Board of Natural Resources and Conservation	Power over sanitation matters only of state waters	No conservation or improvement initiating functions	Uncontrolled	River Conservancy Districts. Drainage and Sanitary Districts	Sanitary Water Board must approve plans of districts. County organization and administrative control	For all water improvements. Some can manufacture power	Usual laws	Illinois Commerce Commission Usual powers	No Control

WATER RESOURCES CONTROL IN STATES (Continued)

STATE	HAS A WATER RESOURCES SURVEY BEEN MADE AND A CONSERVATION PROGRAM BEEN DEVELOPED? By whom?	CENTRAL BOARD, DEPARTMENT OR OFFICIAL HAVING CONTROL OVER WATER AND WATER STRUCTURES AND DEVELOPMENT AND CONSERVATION: Name of Body, Superintendent or Official Organization	Powers, Functions, Etc.	Method and Object of Control	HYDRO-ELECTRIC POWER DEVELOPMENT: STATE CONTROL OVER AND REGULATION OF USE OF WATER FOR	WATER IMPROVEMENTS AND PROJECTS: VARIOUS DISTRICTS TO ACCOMPLISH THEM: Types of Districts and Powers	Central Supervision Over Districts	Extent of Legislation Concerning Districts	POWERS OF BOARD OF HEALTH OVER WATERS AND WATER STRUCTURES	UTILITY REGULATION OVER WATER COMPANIES AND WATER POWER CO.'S	DAM CONTROL (Reservoirs Generally Included)
INDIANA	None	None	None	None	Uncontrolled	Drainage Districts—General powers	Drainage Commissioner advises and supervises partially. County organization and administrative supervision	Drainage Commissioners can construct specific improvements on petition and hearing	Usual laws	Public Service Commission Usual powers	None. In certain cases permit is required from County Board. Plans do not require approval
IOWA	Partial survey by State Board of Conservation and Parks. Given limited control over certain rivers	State Executive Council	Permits for all water appropriations for power purposes. Cannot itself construct power plants	Object is to achieve general conservation of power possibilities	State Executive Council controls power projects	Water course changes and water districts Drainage and levee districts Classified cities regarding flood control and water power projects	County Authority County Authority River Front Improvement Comm. appointed by Governor	Detailed Code. No central control Detailed Code. No central control General powers regarding water improvements in city limits	Usual laws	Partial regulation by statute	State Executive Council must license all dams on navigable streams. If for Power or industrial uses license is required on all streams
KANSAS	Division of Water Resources of State Board of Agriculture	Division of Water Resources to develop effective conservation program	Complete powers over use of water for all purposes. Grants water rights	Must approve all water projects. Cannot itself construct or develop	Division of Water Resources to control use of waters for	Conservancy Act. Court to organize Conservancy Districts for all water improvements, etc. Drainage and Irrigation Districts	Plans must conform to general program of Division of Water Resources. Court control over operations of the districts Several types. County and court formation, etc. Political divisions may organize them. Detailed laws	Conservancy act complete. The District Board has full control over all waters in district	Usual laws	Public Service Commission Usual powers	Engineer of Division of Water Resources and Highways Comm. must approve all plans. Power dams may be built, under court order, if license is granted to use water for this purpose. No provisions for supervision, inspection, etc.
KENTUCKY	None	Controlled by local Judges	County Judge on petition, etc., may appoint Water Dist. Comm. to plan a water supply project		Uncontrolled	Water districts, drainage, levee, reclamation, ditch, etc., districts	County Judges No central supervision	Full procedural code	Usual laws	Partial regulation by statute	No control
LOUISIANA	State Department of Conservation to study, etc., natural resources of the State	None	None	None	Uncontrolled	Water improvements, drainage and levee districts can be set up	County (parish) control only	Full laws concerning powers and organization	Usual laws	None	On navigable streams need dam permit from Land Office of State and approval of Conservation Commission (Fish and Game). Very limited control
MAINE	Public Utility Commission to survey—also State Forest Warden (also called State Water Power Commission)	Public Utility Commission. Uses of certain streams, lakes and ponds, etc., regulated by statute	This body is mainly advisory and investigatory. No actual licensing or control powers	Rule making powers (slight)	Uncontrolled	Water Districts of several types. Group water projects	Justice of Peace and County auspices. County Commissioners in charge	The usual code regarding formation and operation of districts	Public Utility Commission controls pollution and sanitation problems. State Board of Health—Usual laws	Public Utility Commission Usual powers	Plans must be filed with Public Utility Comm. Governor appoints Comm. of Dams & Reservoirs, who inspects and orders changes on complaint
MASSACHUSETTS	No State-wide plan Waterways Dept. to formulate	State Legislature must enact all water projects approved by Courts on petition to them Waterways Dept. of Dept. of Public Works	To carry out water plans approved by Legislature and to control pollution	Licence certain water structures. Intricate codes regulating certain lakes, rivers, etc.	No real control—must petition court for approval	Water districts for counties and metropolitan water districts, etc.	Set up by State Legislature	Full code provided for all sorts of water development and improvements except power	Board of Health General supervisory powers over all inland waters	Public Utility Department Usual powers	Dams over 10-ft. high or impounding over 1-million gallons need be licensed, inspected, accepted and supervised by County Commissioners
MICHIGAN	Dept. of Conservation acting through Conservation Commissioners	Dept. of Conservation—Commission of Highways, Dept. of Mich.	Advisory only Must approve all changes in water courses	No control No water conservation functions or objects	Uncontrolled. State Law encourages free appropriation of water for power purposes	Drainage (general water development) districts. Several types	County and Court auspices	County Drainage Comm's general control over district operations. Counties can construct structures (water) at will	Usual laws	Public Utility Commission Usual powers	On navigable waters County approval needed. No inspection, etc., provided for
MINNESOTA	State Conservation Commission	State Conservation Commission. Acts through Conservation Commissioner and his appointed sub-directors	Full advisory, rule making and general control powers over waters	Over all districts. Can itself put in effect projects with court approval	No real control. State Conservation Comm. must approve construction. Cities may develop water power	Conservancy Districts. General water improvements of all sorts. Drainage, etc., Districts	By Courts subject to State Conservation Commission and Commissioner of Drainage and Waters	Detailed code. Plans of such districts to be filed with Sec'y. of State. Also construction by County Courts	Usual laws	None	Partial control only by State Conservation Commission and County Government
MISSISSIPPI	None	None	None	None	Uncontrolled	Several types of districts for various water improvements may be formed	County chancery court control	Full laws concerning their organization, etc. Cannot generate power	Limited jurisdiction	None	County permits but does not approve plans to build certain structures. Slight control
MISSOURI	Survey Commission	Survey Commission	Purely advisory. No conservation program in operation	Special regulatory acts pertaining to certain rivers	Uncontrolled	Nine types of districts for water, water improvements, drainage, etc.	Mostly court organization and supervision	Detailed code Courts on own motion may undertake water project	Usual laws	Public Service Commission Usual powers	County Commissioners must first assess damages before building dam on navigable streams. All others unsupervised. No inspection

STATE	HAS A WATER RESOURCES SURVEY BEEN MADE AND A CONSERVATION PROGRAM BEEN DEVELOPED? By whom?	CENTRAL BOARD, DEPARTMENT OR OFFICIAL HAVING CONTROL OVER WATER AND WATER STRUCTURES AND DEVELOPMENT AND CONSERVATION: Name of Body, Superintendent or Official Organization	Powers, Functions, Etc.	Method and Object of Control	HYDRO-ELECTRIC POWER DEVELOPMENT: STATE CONTROL OVER AND REGULATION OF USE OF WATER FOR	WATER IMPROVEMENTS AND PROJECTS: VARIOUS DISTRICTS TO ACCOMPLISH THEM: Types of Districts and Powers	Central Supervision Over Districts	Extent of Legislation Concerning Districts	POWERS OF BOARD OF HEALTH OVER WATERS AND WATER STRUCTURES	UTILITY REGULATION OVER WATER COMPANIES AND WATER POWER CO.'S	DAM CONTROL (Reservoirs Generally Included)
MONTANA	Partially by Mississippi Valley Conservation Comm.	Mississippi Valley Conservation Commission County Courts	Only advisory Grants water rights permits, settles disputes, and orders enforcing methods provided	No Control Powers Purpose is determining priority in use of water	Permit of County courts needed No conservation policy	Irrigation Districts (include all water improvements). Drainage districts, etc.	Court organization and State Engineer must approve all construction plans. Court Control. No central supervision.	Full water & irrigation codes, etc.	Usual laws	Public Service Commission Usual powers	The State Engineer, County Boards and County Courts can order alterations after complaints & hearings. No approval of plans, etc.
NEBRASKA	Department of Public Works. University of Nebraska to devise conservation program	Dept. of Public Works divides state into subdivisions to carry out its program & powers	Grants permits for any use of water. Can appropriate any water for any State use on construction	Controls all waters, waterways and water projects. No wells to be dug, without permit of Regent of Univ. of Nebraska	Dept. of Public Works must approve & license all projects	Power developing districts. Six types of water development and improvement districts. Urban Power Districts	Dept. of Public Works. Court control. Dept. must approve all plans, etc.	Complete detailed code governing all phases of such districts & projects	Usual laws	State Railway Commission Usual powers	All dams impounding over 10-acre feet need be permitted by Dept. of Public Works through State Engineer. This Dept. inspects, orders changes, etc.
NEVADA	State Engineer to map, etc. State Board of Irrigation to devise program	State Engineer. He divides State into water districts. Governor appoints Commissioner for each who acts under him	Full permit powers over all uses of water	Full water code to determine rights to receive permits to use waters	State Engineer issues permit before development proceeds	Water Improvement Districts Water Storage and Drainage Districts Water Districts Irrigation (general water) Districts	State Engineer County Auspices County auspices, also State Engr. need approve County control and State Engr.	Usual detailed codes found in western semi-arid states	Usual laws	Public Service Commission Usual powers	State Engineer has full powers over dams. None can be built without his license. Full supervisory powers. This control implied; not expressed
NEW HAMPSHIRE	None	None	The Governor may institute suits in the name of the State to prevent the injurious diversion of waters of rivers which flow into New Hampshire from other states	None	The Public Service Commission has complete control over the exportation of power	No districts provided for	Counties can supervise and authorize water construction on proper procedure		Usual laws	Public Service Commission Usual powers and comprehensive control over the conditions of exportation of power	Public Service Commission in full charge of all dams over 25-ft. high and dangerous ones. Their permit is required.
NEW JERSEY	State Water Policy Commission. Many special commissions, having various powers, exist to control pollution of certain rivers, navigation, etc.	State Water Policy Commission. The State is divided into two water supply districts. The Commission subdivides them, appoints superintendents over each and regulates their acts	Full powers for conservation, control, construction, etc. Reports annually to Legislature	This Commission fully regulates all water development	State Water Policy Commission has full control and effects conservation program	Water districts. County construction possible	State Water Policy Commission. Sanitary and Economic Water Commission to control all pollution cases, etc.	Ample statutes	Usual laws	Public Utility Commission Usual powers	All dams over certain size are under full control, in all respects, by the Water Policy Commission. Must license all dam construction (if over 5-feet high or unless drains area of 100 acres)
NEW MEXICO	State Conservation (advisory) Commission	State Engineer control. State Reservoir and dams provided for	Complete control over all appropriations of water for any use other than domestic	To regulate usage of the limited water supply. No conservation program being effected. General rule making power	No power development without license of State Engineer	Conservancy districts for all purposes including power development Community springs and ditches. Drainage, flood, irrigation and other districts	Court auspices No central control over County organization of	Elaborate water and water districts codes Full laws and governing rules	Usual laws	State Corporation Commission Partial control	State Engineer's permit needed to build. He inspects, orders alterations, etc. Full control
NEW YORK	Commission appointed 1930 to devise conservation program and put it in effect after securing legislative approval. Surveys made	State Water Power and Control Commission (part of State Conservation Commission—Dept.)	Full control over all water uses and developments. Has construction powers The Commission has broad rule making powers; many judicial functions; and is regulated by an especially detailed code.	Supervises every type of water project and district. Full conservation powers.	State Water Power and Control Commission must license, but only with Governor's approval carries out power conservation program. Town and State Reservoirs.	River regulating districts (storage reservoirs), general water improvement districts, water supply projects, union water districts. Drainage and drainage improvements districts for all purposes can be set up	All are organized by, controlled by and report to Water Power and Control Commission	Complete and detailed laws regulating organization, projects, financing, managing, etc., of all of these types of projects and districts	Usual laws	Public Service Commission Usual powers	State Water Power and Control Commission has full powers over dams 10-ft. high and over (and over 1 million gallons). Actual supervision by the Supt. of Public Works
NORTH CAROLINA	Department of Conservation and Development to formulate coordinated plan	The Dept. of Conservation and Development has only advisory powers over waters.	None	None	Uncontrolled	Water improvements may be accomplished by several methods: by corps, individuals, agreements and districts	General county supervision No central control	Detailed laws regulating all phases of each method of development	Usual laws	State Corporation Commission Usual powers	No real control. County court assesses damages. Conservation Dept. approves provisions in dams for passage of fish
NORTH DAKOTA	State Flood Control Commission and Flood Control Engineer. Also State Engineer to map, etc.	State Engineer State divided into four water divisions. He subdivides and appoints superintendents to run them. Special acts govern certain waters	State Engineer must issue permit for use of any waters	Control of waters complete	Permit to appropriate waters for power purposes needed from State Engineer—priority of application, etc., the basis. Missouri River Power Commission to plan development	Artesian Wells Conservancy districts for full development of waters of districts for all purposes Drainage and Flood Districts	County license. State Engineer over such wells County auspices State Engineer generally over State Flood Control Commission and State Engineer	County license. State Engineer over such wells Detailed code. Cannot develop power Elaborate codes. County control boards	Usual laws	Board of Railroad Commissioners Usual powers	Uncontrolled. County court to assess damages though right to construct is not hampered other than that construction must be begun in one year thereafter

WATER RESOURCES CONTROL IN STATES (Continued)

(The summary below is intended to present a general picture only of the regulatory practice in the various states of the United States. It is not sufficiently detailed or comprehensive to be used for accurate reference in the case of any of the individual statutes.)

STATE	HAS A WATER RESOURCES SURVEY BEEN MADE AND A CONSERVATION PROGRAM BEEN DEVELOPED? By whom?	CENTRAL BOARD, DEPARTMENT OR OFFICIAL HAVING CONTROL OVER WATER AND WATER STRUCTURES AND DEVELOPMENT AND CONSERVATION: Name of Body, Superintendent or Official Organization	Powers, Functions, Etc.	Method and Object of Control	HYDRO-ELECTRIC POWER DEVELOPMENT: STATE CONTROL OVER AND REGULATION OF USE OF WATER FOR	WATER IMPROVEMENTS AND PROJECTS: VARIOUS DISTRICTS TO ACCOMPLISH THEM: Types of Districts and Powers	Central Supervision Over Districts	Extent of Legislation Concerning Districts	POWERS OF BOARD OF HEALTH OVER WATERS AND WATER STRUCTURES	UTILITY REGULATION OVER WATER COMPANIES AND WATER POWER CO.'S	DAM CONTROL (Reservoirs Generally Included)
OHIO	Dept. of Public Works (headed by its Engineer)	Dept. of Public Works	Full conservation and construction powers. Can put in effect, with Governor's approval, any water project	Can develop power. Does not license private use of water	No real control. Dept. of Public Works can acquire power sites and build plants	Conservancy act: districts. Various drainage, water supply and other districts	Court organized; governed by elected board. Some are under county and some under court control	Control all uses of water in the district. Full laws. Many methods of achieving water improvements are provided	Usual laws	Public Utility Commission Usual powers	None
OKLAHOMA	State Conservation Commission	State Conservation Commission must approve all intended water construction	Full conservation, construction, and control powers, also advisory. Takes over power plants	Its permit needed for any use of water. Use of Arkansas River regulated by statute	State Conservation Commission's license needed—it can take over private plants	Conservancy Districts Water Improvement Districts	Court organized under State Conservation Commission. County control	For all water improvements Complete code for supply purposes	Usual laws	State Corporation Commissioner Usual powers Works with State Conservation Commission	Plans must be approved by State Conservation Commission. No provision for supervision or inspection
OREGON	State Water Reclamation Commission	State Engineer (follows plans of Water Reclamation Commission)	Full control over waters. Need license for all uses. Can construct approved projects	Full rule making powers over all uses of water. Conservation purposes	Hydro-electric Comm. of Oregon. Must license all power projects and fully regulate their operation. 50-year licenses. Follows details of Water Power Cons. Act of 1931	Public Utility Districts Irrigation, flood, drainage, artesian well and other districts	Hydro-electric Comm. controls. Election sub-districts (as cities). State Engineer is over and County Court organizes	Detailed Public Utility District Law. Full procedural laws and regulatory acts	Usual laws	Public Service Commission Usual powers	State Engineer has full powers over all phases of dam operation and construction. Power dams under Hydro-electric Commission and State Engineer
PENNSYLVANIA	Water Power and Resources Board (of State Dept. of Forest and Waters) Giant Power Survey Board	Water Power and Resources Board reports annually to Legislature	Complete powers over all new uses of water, can construct and put conservation program in effect	Must approve all water construction. Full rule making powers concerning all uses of water	Water Power and Resources Board must license and regulate all power projects. Conservation the basis	Water Supply Districts Special acts governing Delaware River Improvements Pymatuning River Project Other drainage projects, etc.	Court control State Department of Forests and Waters County court control	Fairly complete act Reservoirs for flood control authorized by Legislature Much general water legislation	Sanitary Water Board Usual laws	Public Service Commission regulates corporations licensed by Water Power and Resources Board	Water Power and Resources Board has full control over dams dangerous to public safety, or draining more than ½ square mile
RHODE ISLAND	Commission appointed to study 1927	None Board of Purification of Waters	This body possesses jurisdiction over pollution	The use, etc., of specific bodies of water regulated by numerous un-coordinated statutes	None	No general districts can be formed	Legislature authorizes specific improvements	Much unconditioned water legislation	Limited control. Cannot approve plans but can order changes	Public Utility Commission Usual powers	Commissioner of Dams and Reservoirs appointed by Governor. Must approve plans; inspects, orders, changes, etc.
SOUTH CAROLINA	No general survey Inland Waterway Commission to develop on inland waterways	None	None	None	Uncontrolled	Several types of water improvement districts of various sorts. Cities and towns have full water construction powers — unsupervised	County and Court auspices	Certain districts can develop power. No central project possible without local consent	Usual laws	State Railroad Commission Usual powers	Sight control by county commissioners. Complaints re non-power dams handled by courts.
SOUTH DAKOTA	State Engineer Surveys etc. all waters	State Engineer	Must permit all use of water and all water construction. General rule making power and administrative control over all water appropriations	Beneficial use and priority of application is basis of granting permits. No conservation program	All power development over 25 horse power must be licensed by State Engineer. Town Boards can use water for power purposes subject to State Engineer's approval	Artesian wells. Several methods provided Irrigation districts and projects Three types of improvement districts	State Engineer above county and city authorities County and State Engineer control County and court auspices and State Engineer's control	Full code These fully regulated and have general construction powers Special commissions to formulate development of certain rivers	Usual laws	Special act govern such companies	State Engineer must license all water structures including dams. No special laws relate to dams
TENNESSEE	Courts appoint commissioners to survey watercourses	None Water control delegated to county courts	None	None	Must get permit of local government to construct. No coordinated or general development program	County courts to develop navigable waters of the State. Levee construction and all watercourse construction Many types of water improvement districts	Needs county and court approval All with county and court supervision only	Sparse legislation Full code	Advisory powers	Little legislation regulating	No effective control. County courts can abate dangerous dams and must permit building of all dams
TEXAS	State Board of Waters Engineers State Reclamation Engineer	State Board of Water Engineers to formulate conservation plans State Reclamation Engineer	Absolute control of any use of water over certain amounts. Grants permits to use. Must approve all water structures Levee and Flood Control projects under Reclamation Engineer	Full water code sets forth order of preferences in granting water permits. Counties and cities can construct water projects only with its approval The Board hears all disputes concerning water.	State Board of Water Engineers must license (for 2,000 horse power and over). Has full control	Water improvement districts for all water improvements Water control and improvement districts for conservation projects. Can develop power Fresh water supply districts Levee improvement districts Drainage, conservation, reclamation and irrigation districts	County auspices County court auspices County State Reclamation Engineer County Court Organization. State Board control	All under State Board of Water Engineers. Elaborate water code Full code Full codes	Usual laws	Water and power companies regulated by State Board of Water Engineers and must be chartered by it	Power and irrigation dams under full control of State Board of Water Engineers. Levees and flood works under full control of State Reclamation Engineer

WATER RESOURCES CONTROL IN STATES (Continued)

STATE	HAS A WATER RESOURCES SURVEY BEEN MADE AND A CONSERVATION PROGRAM BEEN DEVELOPED? By whom?	CENTRAL BOARD, DEPARTMENT OR OFFICIAL HAVING CONTROL OVER WATER AND WATER STRUCTURES AND DEVELOPMENT AND CONSERVATION: Name of Body, Superintendent or Official Organization	Powers, Functions, Etc.	Method and Object of Control	HYDRO-ELECTRIC POWER DEVELOPMENT: STATE CONTROL OVER AND REGULATION OF USE OF WATER FOR	WATER IMPROVEMENTS AND PROJECTS: VARIOUS DISTRICTS TO ACCOMPLISH THEM: Types of Districts and Powers	Central Supervision Over Districts	Extent of Legislation Concerning Districts	POWERS OF BOARD OF HEALTH OVER WATERS AND WATER STRUCTURES	UTILITY REGULATION OVER WATER COMPANIES AND WATER POWER CO.'S	DAM CONTROL (Reservoirs Generally Included)
UTAH	State Engineer (part of duties of office to work with Utah Water Storage Commission)	State Engineer has plenary powers. State Land Board	Full control over all waters. Must grant water permit for any use. Hears disputes Slight reclamation powers	Full rule making power. Must authorize all construction. Supervises, through agents distribution of all waters To build State Reservoirs, etc.	State Engineer to license Certain rivers cannot be appropriated or can be withdrawn from use	Water conservation districts Conservation of underground waters Irrigation, drainage, etc. districts	County organization subject to State Engineer County control County organizations, all under State Engineer	Complete codes concerning them Cities can control sources of their water supply	General powers only State Engineer has full powers in pollution and waste matters	Public Utility Comm. Usual powers	Permit of State Engineer needed for dams over 10-feet high or impounding more than 100 acre-feet He has full power
VERMONT	Public Service Commission and State Engineer to survey	None	None	None	Uncontrolled	County Projects possible No Districts	County courts have some power over water construction		Advisory powers	Public Service Comm. Usual powers	If to store over 5,000 cubic feet of water, need approval of Public Service Comm. and town officials Full control exists
VIRGINIA	Commission on Conservation and Development	Commission on Conservation and Development Corporation Commission	General powers over the "Waters of the State" as defined by statute License all structures and follows plans of Commission on Conservation and Development	No permit granting powers for general use. Advisory Ordinary use of water not controlled. Rule making power re all water structures and developments (power)	Power licenses granted according to water code by Corporation Comm. Complete regulatory powers. Full code	General Water Improvement Districts	Court auspices	Full laws No central control	Usual laws	Corporation Commission Usual powers	State Corporation Comm. has complete control over dams in "Waters of State," all others with court permit. Full laws
WASHINGTON	State Hydraulic Engineer to survey Also to cooperate with State Department of Conservation	State Hydraulic Engineer State Department of Conservation	Must license all uses of water and all water structures Advisory—controls irrigation and reclamation projects. Columbia River Basin Project now being developed	He settles all water rights disputes, dividing the State into divisions for administrative purposes Under State Control	State Hydraulic Engineer must license the project. Basis is priority of right to use	Power and Water Districts Public Utility Districts Reclamation, irrigation, etc. districts Distribution districts, Artesian wells and drainage districts	County organizations State Hydraulic Engineer licenses. Public Service Comm. regulates management County organized subject to State Director of Conser. & Develop. County supervision under Hydraulic Engineer	For all water and power construction and development. Detailed code Full code	Usual laws	Public Service Commission Usual powers	State Hydraulic Engineer has full control of all sorts over dams impounding more than 10 acre-feet
W. VIRGINIA*	Public Service Commission	Public Service Comm. State Water Comm.	Complete control over all hydro-electric power developments. Advisory—controls pollution only	No construction powers. No conservation powers other than over hydro-electric projects	Complete power license code—all controlled by Public Service Commission. State can itself develop power projects	Water improvement districts County courts have general control over water courses	Circuit Court organizes. State Engineer need only approve plans for State construction	Usual code regulating. Full construction powers, etc.	Usual laws State Water Comm. over stream pollution	Public Service Commission Usual powers, plus those stated	Public Service Comm. need approve power dams. No inspection. Other dams need court permits. Commission hears complaints re dams and other structures
WISCONSIN	State Utility Corporation of Wisconsin to develop plan for control and conservation. Purely Advisory	Public Service Commission to put in effect and follow plan of State Utility Corp. Comm.	Public Service Comm. must license all uses and structures on navigable waters. Also hears complaints	No control over non-navigable waters	Public Service Comm. controls and must license in accord with State plan of State Utility Corporation of Wisc.	Municipal Power and Water Districts Drainage, Irrigation, etc.	Formed by County Officials. Public Service Comm. must approve Court control	Complete code Separate codes for district projects and court projects	Usual laws	Public Service Commission Usual powers, plus those stated	Public Service Comm. has powers over all dams on navigable waters and over others that may be dangerous
WYOMING	Board of Health control — with State Engineer. Commission to study development of Colorado River	State Engineer above whom is Board of Water Control which has general supervisory and appellate functions	State Engineer must grant permit for any use of water. Must license water structures. He is to regulate and develop Little Snake River	He hears disputes and appoints water commissioners for divisions of State etc.—subject to Board of Water Control. Special Comm. over distribution of waters of Colorado River	State Engineer must license. Board of Water Control hears appeals from his divisions concerning water rights	Water improvement districts (called irrigation districts) Drainage districts Artesian wells	Court formation Court formation County control only	Elaborate code. Can manufacture power State Engineer above districts	Usual laws	Public Service Commission Usual powers	State Engineer need inspect, can authorize, and can order alterations
MARYLAND	Water Resources Commission 1931	None	None	None	Uncontrolled	Drainage districts only	State organized	Incomplete laws	Usual laws	Public Service Commission Usual powers	None

Note: "Usual powers"—when applied to Utility Commission implies control over exercise of franchises, rates charged and regulation of the relations between the public and the companies.

Note: "Complete laws or code"—when this phase is applied to any of the numerous types of water improvement districts, it means that detailed provision is made regarding petitions, hearings, investigations, elections and appeals necessary to form the districts; the management, plan formulations, water construction, bond issues, assessments, books, hearings, supervision, letting of bids, dissolution, policing, inclusion and exclusion of lands and all the other phases of their operation.

Note: "Usual laws"—when applied to Board of Health powers implies complete control over sanitary conditions of all waters and water structures. All plans for any water use or water construction must first receive its approval before construction may be begun. In its limited sphere such Board is in full control and possesses full order enforcing and permit granting powers.

*The water power act of 1929 was held unconstitutional in the case of Hodges vs. Public Service Commission, 110 W. Virginia, 649, 1931.

APPENDIX E

FINANCIAL STATEMENT.

FINANCIAL STATEMENT

WATER RESOURCES COMMISSION OF MARYLAND

Appropriation for 1932 and 1933 (Chapter 150 of 1931, Miscellaneous Appropriations, General Funds.)		$5,000.00
Expenditures—		
Salary of Secretary—November, 1931-January, 1933, inclusive	$600.00	
United States Geological Survey for preparation of Stream Gazetteer	400.00	
Expenses in preparation of Report to 1933 Legislature.	769.06	
Printing, Postage, Stationery, etc	800.00	
Total Expenditures		2,569.06
Unexpended Balance as of February 1, 1933		$2,430.94