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BUREAU OF WATER
—
ANNUAL REPORT
PHILADELPHIA
—
1911

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ONE HUNDRED AND TENTH ANNUAL REPORT

OF THE



BUREAU OF WATER

FOR THE

YEAR ENDING DECEMBER 31, 1911

ALSO

ANNUAL REPORT

OF

MORRIS L. COOKE

Director of the Department of Public Works

ISSUED BY THE CITY OF PHILADELPHIA, 1912

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ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC WORKS

FOR THE

YEAR ENDING DECEMBER 31, 1911

TWENTY-FIFTH ANNUAL REPORT
OF THE
DEPARTMENT OF PUBLIC WORKS

Philadelphia, February 20, 1912.

HON. RUDOLPH BLANKENBURG,
Mayor of the City of Philadelphia.

MY DEAR SIR:—In compliance with the Act of Assembly creating the Department of Public Works we have the honor to submit herewith the report of the operations of this Department for the year 1911.

Inasmuch as the report is filed three weeks after this Administration went into office and the work was done almost exclusively by my predecessors, it does not seem necessary for me to make any comments on work in which the present Administration had no part.

For the use of those officials in other cities who watch with interest the operations of this Department, and for the purpose of complying with the Act above noted, I have had the following extracts made from the reports of the several Chiefs comprising the Department of Public Works.

BUREAU OF GAS.

The amount appropriated for the use of the Bureau of Gas, \$10,000, was expended during the year.

Under the terms of the lease of the Philadelphia Gas Works to the United Gas Improvement Company, the

latter was compelled to pay into the City Treasury the sum of \$10,000 annually for salaries and expenses of the Bureau.

The main duties of the Bureau are to see that the quality of gas and its illuminating value are maintained, and to make tests of such meters as consumers consider are registering fast.

The chemical composition of gas during 1911 is indicated by the following analyses:

	Per cent.
Carbon dioxide	2.60
Illuminants	11.56
Carbon mon-oxide	26.30
Hydrogen	36.05
Methane	21.45
Nitrogen	1.20
Oxygen	0.84
	100.00

There are about 3,000 tests made annually to ascertain the quality of the gas supplied.

The following table gives the monthly average candle power of the gas furnishel to the consumers:

January	22.60
February	22.59
March	22.66
April	22.68
May	22.77
June	22.62
July	22.65
August	22.59
September	22.79
October	22.63
November	22.59
December	22.68
Maximum monthly average	22.79
Minimum monthly average	22.59

BUREAU OF HIGHWAYS.

There were 22 miles of streets opened and graded during the year by the City, and by builders without expense to the City. There were 18.61 miles of new streets paved with modern materials and three miles of old cobble and rubble paved streets were repaved with improved material.

In August, 1911, bids were received for macadamizing roads aggregating \$200,000, but owing to the threatened litigation by the Taxpayers' Committee it was not until very late in the season that the Department was able to award contracts, and therefore very little work was done in this particular line during 1911. It is intended to resurface these roads on the advent of good weather.

In the resurfacing which will be done under these contracts, we have provided for using different characters of asphaltic oils so as to prevent the dust nuisance and the disintegrating of the macadam. By using different kinds of oil preparations we will be able to ascertain which gives the greatest satisfaction, and it will demonstrate their comparative fitness for the purpose.

Councils made no appropriation for the maintenance of unpaved and macadamized public highways during the year 1911, and the only attention given these roads was what was done by the emergency repair corps of the Bureau of Highways, which was of a superficial character.

Councils made no appropriation for specific work on these roads during the year 1912, although specifications were prepared and bids received for doing this work during the current year which made ample provision for restoring the dirt and macadam roads to a degree of efficiency. I have forwarded a communication to Councils asking for an appropriation to carry this work into effect.

During the year there were 560,189 square yards of repairs made to all classes of streets within the City by the City's emergency repair corps. This method of making repairs was an innovation, as it was formerly done under the contract system.

Repairs to sewers and bridges were made by the repair corps of the Bureau of Highways, with the exception of a few minor cases where the work was done by contract.

Work on the Northeast Boulevard progressed during the year 1911, between Second and Rhawn streets, but owing to injunction proceedings to test the legality of the supplemental contract the work has been discontinued.

The completion of the Southern Boulevard (South Broad Street) has been delayed pending the decision as to the permanent location of the trolley tracks.

The report of the Assistant Chief of the Bureau in charge of the Division of Street Cleaning gives a resume of the work performed in the cleaning of streets, etc.

BUREAU OF LIGHTING.

Under the lease of the Philadelphia Gas Works this Bureau has the general supervision of all gas lamps in so far as relates to erection, discontinuance and relocation. Under this lease the United Gas Improvement Company is required to erect 300 new gas lamps each year. This is totally insufficient to meet the requirements in newly developed territory. This condition has been prevalent ever since 1898.

The Bureau's report contains a very strong recommendation to change the character of the open flame gas lamps to the improved incandescent system. Were this done, it would provide us with a surplus of about 5,000 lamps, which, used judiciously, could provide ample lighting fa-

cilities for a number of years and also give a modern system such as is used by many up-to-date communities.

The lighting of gasoline lamps also comes under the supervision of this Bureau.

BUREAU OF SURVEYS.

The appropriation for main sewers came very late in the year 1911, but it was practicable to place most of them under contract and a portion of them under construction before the close of the year. The importance of making liberal appropriations for work of this character cannot be urged too strongly on the legislative branch of the City Government, for the reason that this class of work precedes and also induces all development of outlying territory, which yields, after development, such handsome returns to the City through taxation. There has been a large falling off in construction of main sewers, due to insufficient appropriations, for several years past.

The sewer construction during the year amounted to 24.527 miles, divided as follows:

	Miles.
Main sewers	1.381
Branch sewers	12.332
Private sewers	8.384
Grade crossing sewers	1.096
Boulevard sewers	1.264
Widening Delaware avenue039
Sewers in connection with bridges031

The work of the testing laboratory attached to the Bureau of Surveys has been carried on along the usual lines, comprising investigations as to the comparative merits of different materials which enter into the various public works. Considerable experimenting has also been done for the purpose of standardizing specifications for these materials. The City's engineers under whose direc-

tion these experiments are being carried on have been in frequent conference with engineers of other cities and of the United States Government in this regard.

Progress has been made during the year in the extension of the intercepting sewer systems which are built along the banks of the larger streams throughout the City for the purpose of lessening pollution and for the protection of the City's water supply.

In the study of the comprehensive plan for the development of the City, probably the largest single project is that for the improvement of the sewer system and the disposal of the sewage of the City in a sanitary manner. Studies and experiments on this subject have been in progress for several years.

The work which has been carried on during the past year comprised careful studies as to population, present and future; experiments as to the amount of sewage to be disposed of; compiling of data from adjacent American and also foreign cities upon various methods of disposal; preparation of diagrams and plans for the complete system and of a report which is approaching completion upon the whole subject.

The solution of this problem by the City of Philadelphia, as well as similar problems by other cities of the State, is placed upon them by the State Commissioner of Health in carrying out the Acts of Assembly providing for the betterment of public health and the preservation of the waters of the State.

There were ten bridges completed during the year 1911. The most important was the Passyunk avenue bridge over the Schuylkill river. Another important work which is now under way is the widening of the present Chestnut street bridge.

On January 1, 1911, two tracks were placed in service

on the elevated structure of the Philadelphia, Germantown and Norristown Railroad along the line of Ninth street, between Spring Garden street and Wayne Junction, thus removing a great many dangerous grade crossings. During the course of construction there was no interference with the regular train service which, when it is taken into consideration amounts to about 500 train movements daily, is a wonderful performance, and was so attested by the Board of Directors of the Philadelphia and Reading Railway Company.

Work is now in progress along the line of the Richmond Branch of the Philadelphia and Reading Railway Company of the same character.

It is worthy of note that the first exhibit of comprehensive city plans, together with a Convention of City Planning experts, was held in this City from May 15th to June 15, 1911. The exhibit brought together many projects from both foreign and domestic cities, including all the other matters allied with this subject, such as better housing facilities, suburban gardens, architectural improvements, subways, port developments, parkways and parks, street widening and extension and artistic treatment of civic centers.

BUREAU OF WATER.

The total expenditures of the Bureau of Water for 1911 were \$1,797,885.97, of which \$1,415,973.61 was for maintenance and \$381,912.36 for improvements. In addition to the above the Department of Supplies expended \$803,152.84 for materials and supplies for the Bureau.

There was a decrease in the operating expenses for items covered by direct appropriation to the Bureau of \$61,884.64, and also a decrease in materials furnished by the Department of Supplies of \$79,853.91, making a total

decrease in operating expenses of \$141,738.55. The receipts of the Bureau during the same period were \$4,841,882.97, an increase of \$265,525.32 over the year 1910.

The consumption of water during the year was 116,044,866,000 gallons, an increase over 1910 of 1,313,966,000 gallons. The average daily consumption was 317,930,000 gallons and the per capita consumption per day averaged 201.6 gallons, a decrease of 1.6 gallons.

The Queen Lane Filters, while not entirely completed, were put in service November 29, 1911, and have been successfully operating since that date. The average quantity filtered is about 47,000,000 gallons per day.

The daily average quantity filtered at the other filter stations was as follows:

	Gallons.
Torresdale	208,350,000
Belmont	39,690,000
Upper Roxborough	13,000,000
Lower Roxborough	10,056,000

which, together with the Queen Lane filters gave an average daily total of 317,000,000 gallons of water filtered every day.

The total cost of operating the filters during 1911, including the Torresdale pumping station and the pumpage from the upper Roxboro reservoir to the filters, was at the average rate of \$3.90 per million gallons, a reduction of 15 cents over 1910.

During the year 1911 there were 1,382 cases of typhoid fever, of which 223 resulted in death. This averaged 14.1 deaths in each 100,000 population, the lowest rate yet attained since the induction of filtration.

Unless there is a marked reduction in the waste of water the Bureau of Water will not be able to furnish the citizens with a satisfactory supply. For the past four years the

Bureau has been operating at its maximum capacity and during this time the service where the pressure is below the average, has been extending. The Bureau's plant is being worked to its maximum capacity, as neither the filters, the pumping machinery nor the mains can do more than is being done at the present moment.

Philadelphia, to-day, is the only city in the United States that forbids the use of meters, and from a study of the results obtained from other cities that have a reasonable number of their water connections metered, there is hardly a doubt that if meters were placed on those properties wherein waste is detected, the consumption would be so reduced that a good supply could be maintained in all sections of the City.

West Philadelphia has outgrown its water pipe system and it is essential that large new mains should be laid from the pumping station to the filter plant, thence to George's Hill reservoir, and from thence to the southern section of this district. The service has been poor for the last three years. The Bureau is obliged to throttle the discharge valves from the reservoir during the night in order to store enough water to supply the daylight demand. It is estimated these improvements will cost \$600,000.

The total coal consumption during the year was 201,452 tons, at a cost of \$570,483.08, a decrease over 1910 of 13,327 tons, or \$59,639.87. Notwithstanding the lower coal consumption there were pumped 415,411,000 gallons more water than in 1910.

The pumping machinery and boilers are in good condition and largely account for the decreased amount of coal used during the past year, with the exception of the boilers at the Queen Lane Station. These have been condemned by the Bureau of Boiler Inspection and should be

replaced by water tube boilers at the earliest possible moment. Approximate cost \$45,000.

There were laid during the year 26.63 miles of new pipe. Of this amount 6,986 feet were laid by private contract. Two hundred and eighty-one fire hydrants were placed.

The total number of dwellings furnished with water is 324,727, an increase of 9,401 during the year.

DIRECTOR'S OFFICE.

During the year the official photographer connected with this office carried on this class of work in a satisfactory manner. The total cost for salaries and supplies was \$5,162.97, which was a marked saving over what it would have cost had the work been done by outside contract.

Respectfully submitted,

M. L. COOKE,

Director.

ANNUAL REPORT
OF THE
BUREAU OF WATER
FOR THE
YEAR ENDING DECEMBER 31, 1911

OFFICERS
OF THE
BUREAU OF WATER

Chief,
FREDERICK C. DUNLAP.

General Superintendent,
ALLEN J. FULLER.

Assistants to Chief,
WILLIAM WHITBY, H. J. JOHNSON,
SETH M. VANLOAN.

Registrar,
JAMES F. MCCRUDDEN.

Chief Clerk,
J. T. HICKMAN.

Assistants to Chief Clerk,
THOMAS SPENCE, WILLIAM J. LOGAN.

Chief Draughtsman,
JOHN E. CODMAN.

Assistant Engineer,
JOHN S. ELY.

Chemists,
GEORGE E. THOMAS, FRANCIS D. WEST,
Belmont. Torresdale.

Superintendents of Filters,

JOS. S. V. SIDDONS,
Torresdale.

ALBERT TOLSON,
Roxborough.

(Foreman in charge, Belmont.)

ALFRED STEAD,
Queen Lane.

Search Clerk—John S. Todd.

Pipe Inspector—Max M. Segl.

Messenger—Haines Lewis.

Superintendent of Shop—Arthur Molyneaux.

PURVEY DISTRICTS

FIRST DISTRICT OFFICE, 1120 Wharton Street.

Purveyor—Richard James.

General Foreman—Harry Mintzer.

SECOND DISTRICT OFFICE, 918 Cherry Street.

Purveyor—J. H. Bilyeu.

General Foreman—Fred. J. Gheen.

THIRD DISTRICT OFFICE, Beach Street and Susquehanna Ave.

Purveyor—Robert Glenn.

General Foreman—Samuel Duffy.

FOURTH DISTRICT OFFICE, Twenty-sixth and Master Streets.

Purveyor—Chas. T. Moore.

General Foreman—Geo. W. Showaker.

FIFTH DISTRICT OFFICE, 4377 Manayunk Avenue.

Purveyor—H. A. Markley.

General Foreman—W. H. Dawson.

SIXTH DISTRICT OFFICE, Town Hall, Germantown.

Purveyor—George W. Bardens.

General Foreman—Joseph B. Fowler.

SEVENTH DISTRICT OFFICE, Thirtieth and South Streets.

Purveyor—Michael Young.

General Foreman—Jas. H. Tawney.

Telephone Operators,

JENNIE M. HANNINGS.

CALVIN CRAMER.

WORKS—GENERAL

Assistant to General Superintendent—John F. Collins.

Foreman Machinist—Harry S. Mellen.

Foreman Bricklayer—Jos. F. Ogden.

Foreman Carpenter—Henry Guest.

Foreman Plumber—Chas. H. Green.

Foreman Painter—Joseph Fleming.

Foreman Rigger—Lewis Pedersen.

Foreman Laborers—Wm. Calhoun.

Lineman—Edward J. Cavanaugh.

Chief Engineers—Pumping Stations.

Lardner's Point—Harry M. Hillegass.

Torresdale—George M. Maull.

Belmont—George Flannigan.

Shawmont—Robt. Boileau.

Queen Lane—Henry F. Schmidt.

ANNUAL REPORT
OF THE
BUREAU OF WATER
FOR THE YEAR 1911

TWENTY-FIFTH ANNUAL REPORT
OF THE
BUREAU OF WATER

ONE HUNDRED AND TENTH ANNUAL REPORT
OF THE
**OPERATIONS CONNECTED WITH THE CITY WATER
SUPPLY**

Philadelphia, January 1, 1912.

MR. MORRIS L. COOKE,
Director, Department of Public Works.

SIR:—The many improvements inaugurated within the past four years are beginning to make a showing both in the receipts and disbursements of the Bureau.

The cost of maintaining the Bureau for the past year, exclusive of material furnished by the Department of Supplies, was \$1,468,545.65, a decrease of \$9,312.60 from 1910. Including Supply Department charges the total cost of maintenance for 1911 was \$2,271,420.18, a reduc-

tion of \$89,444.82 from 1910. This reduction was made in the operation of the pumping stations and filter plants, and was due to improvements and saving in operation, as the amount of water pumped and filtered was in excess of that of 1910.

The distribution costs were about the same in 1910, but a much larger amount of work was done, as is evidenced by the receipts from pipe frontage, being \$50,555.51 for 1910 and \$136,842.35 for 1911, an increase of \$86,286.84.

The receipts were \$4,848,215.80, \$261,511.15 more in 1911 than in 1910, and the total for 1912 is expected to exceed \$5,000,000. The Bureau is, therefore, on a paying basis, and the revenue is not only ample to pay maintenance, interest and sinking fund charges on Water Loans, but also leaves a balance of \$812,818.46. The increase in the revenue for 1911 over that received in 1907 exceeds \$800,000.

The past year has further demonstrated the efficiency of the filters. They have at all times supplied an effluent that was not only clear and sparkling, but safe for domestic use. Owing to legal difficulties we were compelled to maintain the raw water district until November 29, 1911, the date when the Queen Lane filters were officially placed in commission. The raw water was treated as in former years, and while turbid and unpleasant to the eye, was still safe for domestic use. In fact, the records show that there was no more typhoid fever in this section than in those supplied with filtered water.

Work on the Queen Lane filters, which was stopped on December 19, 1910, was resumed June 21, 1911, but again stopped November 10, 1911. The work, however, was so far advanced that the contractors were persuaded to finish the important features of the work before actually stop-

ping, in order that the plant could be put into service, and for this act deserve the thanks of the community. The work remaining consists principally of grading, granolithic walks, curbing, etc., and the placing of some granite coping. Plans are being prepared to advertise the work remaining, if this course meets with the approval of the Law Department.

The Queen Lane filters have been in service since the above date, and the average quantity filtered per day has been 47 million gallons. The capacity of the station is 70 million gallons per day, and the present surplus is, therefore, not large. It was expected that with these filters in service we would have a large excess of water and be able to divert part of it either directly or indirectly to South Philadelphia, thus improving the water pressure in that section of the City. We are, however, only partly able to accomplish this purpose. The extremely heavy draught all over the City reduces the pressure so much that it is almost impossible to borrow water from the higher sections without seriously affecting them. We are, and have been for the entire year, practically running our pumping stations and filters at their maximum capacity, and the situation was in no way improved in this respect during the year. The per capita consumption is still over the 200 gallon mark, and at this figure it is impossible to get sufficient funds to purchase and maintain pumping machinery and distributing mains of capacities ample to furnish satisfactory service, nor is it economical to try to do so. A reduction of the consumption to 150 gallons per capita would give us a reserve of thirty per cent., and, furthermore, would enable the service to be so maintained as to be satisfactory in all parts of the City. The operating and repair expenses would be much less, and the results from an accident to the machinery or mains would not be

serious. While the layout of the pumping stations and the location and size of the distributing mains are according to the best practice, yet on account of being worked to their full capacity they are thereby more liable to accidents, and relatively small breaks can seriously affect the supply, as it is impossible to further increase the delivery through the units.

The situation in West Philadelphia is particularly bad, and cannot be improved without laying a considerable amount of large pipe. This section has grown very rapidly, and no improvements have been made in the distribution system for many years. The large mains are now delivering their full capacity and cannot do any more. The filters, although designed for but 33 million gallons, are, with the help of the pre-filters, filtering 42 million gallons per day. At a relatively small expenditure the pre-filters can be enlarged to filter 60 million, and the slow sand filters in their present condition will take care of this amount of water, but the distributing pipes will not carry more than about 42 million.

The cost of improvements necessary to increase the supply in West Philadelphia to 60 million gallons a day is estimated to be \$600,000. The present situation is so bad that we are obliged to throttle the discharge valves from the reservoirs at night in order to store sufficient water for the next day. The service was poor in many sections last year, will be worse this year, and every means should be taken to secure funds for this improvement. I would state that while the per capita consumption for the whole City is slightly over 200 gallons, that for West Philadelphia is 152 gallons, and there is no question but that the metering of a small percentage of the consumers would materially reduce this amount.

The ordinance forbidding the installation of meters seri-

ously affects the management of the Bureau. There are very many water takers who are obliged under our fixture system of charging to pay much more than they justly should, and they naturally hold the Water Bureau responsible, although we have no authority to do otherwise than make a charge specified by ordinance of Councils on all fixtures on the premises, whether actually in use or not. Likewise there must be others who wilfully or carelessly waste water, and again those who do not pay for the amount of water they use. Many use the argument that "water should be as free as air," and I believe that every one should have the privilege, without undue cost, of using all the water they have legitimate use for, but it is not right for a few to carelessly or selfishly allow water to waste that is badly needed by their neighbors.

Water, in large communities, is a manufactured article of which every citizen is entitled to his share, and those who want two or more shares, or desire to deprive others of their portion, should not be allowed to do so. To illustrate: I do not believe that any person should be deprived of the privilege of going to the Schuylkill or Delaware river and taking therefrom all the water he personally needs for domestic purposes, nor should he be required to pay for the privilege, but when the community combines and goes to the expense of building and maintaining pumping stations, reservoirs, filter plants, and miles of distributing pipe, etc., it is not equitable that one party should deprive another of his share of the water, or that a larger unit charge should be made against one than another.

Under our present system of charging, a manufacturer who is so unfortunate as to be compelled to run his plant on half-time only must pay the same water rent as one running full time, or 24 hours a day. An ordinance has been introduced into City Councils and referred to the

Water Committee, giving any water consumer in the City the privilege of having a meter, and also authorizing the Bureau to install a meter, at the cost of the City, on any consumer (except private houses) that it may think advisable, charging for the water used at the meter rate.

The further argument that if meters are installed sufficient water from the health standpoint will not be used has proved to be wrong. A minimum charge is made, which is sufficient to provide for all the water that can reasonably be used, and the experience from hundreds of towns is that there is no diminution in the legitimate use of water from the fact that the supply is metered.

The total quantity of water filtered during the year, except that at Queen Lane, was 98,943,760,000 gallons, an increase of 440,390,000 gallons over that of 1910, divided as follows:

	Cost.	Gallons.
Torresdale	\$126,325.14	76,047,640,000
Belmont	42,041.50	14,486,190,000
Upper Roxborough	14,114.68	4,739,430,000
Lower Roxborough	20,369.72	3,670,500,000
Total	202,851.04	98,943,760,000

The total cost, exclusive of pumping, was \$202,851.04, or \$2.05 per million gallons filtered, a reduction of \$7,872.58, or \$0.09 per million gallons. The above included \$36,269.54 for operating the preliminary filters at Lower Roxborough, Belmont and Torresdale, at an average cost of \$0.385 per million gallons.

The total cost of filtration, including the Torresdale Pumping Station and the pumpage from the Upper Roxborough reservoir to the Upper Roxborough filters, for the year was \$388,389.20, or \$3.93 per million gallons filtered, a reduction of 15 cents per million gallons over 1910; the cost of pumping at the Torresdale Station being \$2.17 per million gallons filtered.

No costs are given for the Queen Lane filters, as the plant was only in service for two months and none of the sand filters have been cleaned. The figures, therefore, would be misleading.

Typhoid Fever.

The success of a filter plant and the quality of water supplied a community is judged largely by the number of typhoid fever cases and deaths therein. The following table shows the number of typhoid fever cases and deaths in Philadelphia during the past eleven years.

It is most gratifying to notice the very marked decrease in this disease during the interval noted. The progress of the purification of our water supply can be plainly seen by these figures. Philadelphia in the past year had the lowest death-rate from typhoid fever it has experienced for over fifty years.

Year.	Cases typhoid fever.	Deaths from typhoid fever.	Typhoid fever death rate per 100,000 of population
1901.....	3,669	444	33.7
1902.....	5,006	538	43.8
1903.....	8,701	957	70.1
1904.....	6,587	744	53.5
1905.....	6,450	684	48.3
1906.....	9,721	1,063	73.8
1907.....	6,762	890	60.6
1908.....	3,502	533	35.7
1909.....	2,336	331	21.8
1910.....	1,745	270	17.4
1911.....	1,382	223	14.1

A number of the cases for this year were directly traceable to sources other than the water supply.

The excellent results obtained last year from placing the water rent and inspection division of the Bureau in charge of a Registrar have continued. It is proposed to uniform the outside inspectors next year, which should prove a safeguard to the public.

The delinquent water rents of more than two years' standing have been almost eliminated, and those of a later date are not large.

Consumption.

The consumption of water during 1911 was 116,044,866,000 gallons, an increase of 1,313,966,000 gallons over that of 1910. The average daily consumption was 317,930,000 gallons, an increase of 3,599,000 gallons per day. The per capita rate was 201.6. The population was assumed to be 1,577,200.

The average daily pumpage of the Bureau was 552,526,000 gallons, divided as follows:

	Gallons.
Pumpage into distribution.....	317,930,000
High service pumpage	8,150,000
Low service pumpage—filters.....	226,446,000
	<hr/>
Total daily average pumpage.....	552,526,000

The daily average pumpage from the main pumping stations was as follows:

	Pumpage—Gallons.
Lardner's Point	204,420,000
Belmont	43,818,000
Queen Lane	42,582,000
Roxborough	27,110,000
	<hr/>
Total	317,930,000

Of the above, 64.3 per cent. was pumped from the Delaware river and 35.7 per cent. from the Schuylkill river,

and 86.6 per cent. of the total supply was filtered previous to November 29, 1911, after which date all the water furnished was filtered.

The total quantity of water filtered during the year was 100,906,770,000 gallons, divided as follows:

Torresdale	76,047,640,000
Belmont	14,486,190,000
Queen Lane	1,963,000,000
Upper Roxborough	4,739,440,000
Lower Roxborough	3,670,500,000
Total	100,906,770,000

Revenue Collected.

The revenue collected on account of the Bureau from all sources amounted to \$4,848,215.80, exceeding that of the preceding year by \$261,511.15.

The total collections during 1911 and the amounts for the several items, as compared with those of the preceding year, were as follows:

	1910	1911	Increase	Decrease
Water rents -----	\$3,972,300 58	\$4,153,964 53	\$181,663 97	
Meter rents -----	416,279 42	432,812 59	16,533 17	
Frontage -----	50,555 51	136,842 35	86,286 84	
Collected by City Solicitor...	82,866 81	28,753 29		\$4,113 52
Penalties -----	44,490 75	45,901 21	1,410 46	
New connections -----	17,103 10	15,816 00		1,287 10
Searches -----	2,557 50	2,638 75	81 25	
Miscellaneous -----	40,069 97	19,949 00		20,150 97
Department of Supplies.....	884 03	3,694 08	2,810 05	
Ferrules, Highway Department	9,567 00	7,844 00		1,723 00
Totals.....	\$1,586,705 65	\$4,848,215 80	\$288,785 74	\$27,274 59
			27,274 59	
Net increased collections, 1911			\$261,511 15	

The following table shows the receipts of the Bureau for the years 1907 and 1911:

	1907	1911	Increase	Decrease
Water rents -----	\$3,496,430 00	\$4,153,964 53	\$657,534 53	
Meter rents -----	323,890 53	432,812 59	106,922 06	
Frontage -----	107,071 85	136,842 35	29,770 50	
Collected by City Solicitor-----	39,771 06	28,753 29		\$11,017 77
Penalties -----	34,504 20	45,901 21	11,397 01	
New connections -----	11,238 00	15,816 00	4,578 00	
Searches -----	3,996,00	2,638 75		1,357 25
Miscellaneous -----	3,917 72	19,949 00	16,031 28	
Department of Supplies-----	3,927 31	3,694 08		233 23
Ferrules, Highway Department	7,592 00	7,844 00	252 00	
Totals-----	\$4,032,338 67	\$4,848,215 80	\$823,487 38	\$12,608 25
			12,608 25	
Net increased collections, 1911, over those of 1907			\$815,877 13	

*Statement of Appropriations and Expenditures for the
Year 1911.*

Appropriation for 1911.....	\$1,024,151 00
Balance available from previous year.....	369,055 82
Additional appropriation and transfers.....	1,071,328 95
Total	\$2,464,535 77
Amount of warrants drawn during year.....	\$1,797,885 97
Maintenance (does not include Department of Sup- plies amount, \$802,874.53)	1,468,545 65
For extensions	329,340 32
Transfers from	64,554 39
Balance available for 1912.....	569,255 07
Amount merging	32,840 34
Total	\$2,464,535 77
Total receipts	\$4,848,215 80
Number of warrants drawn.....	3,251
Number of employees, December 31, 1911.....	1,815

Expenditures, 1911.

Maintenance:	
Salary and pumping station pay rolls (clerks on duplicates, \$3,593.82)	\$533,992 58
Buildings, grounds and reservoirs pay rolls.....	327,945 46
District and improvement pay rolls.....	307,645 08
Bureau repair shop pay rolls.....	39,014 97
Hydrographic corps	1,596 00
Filtration pay rolls	162,441 91
Resanding and incidental expenses operating filters.	2,620 31
Supplies and repairs from direct appropriation.....	93,289 34
	<hr/>
Total	\$1,468,545 65
Materials furnished by Department of Supplies....	802,874 53
	<hr/>
Total cost of maintenance.....	\$2,271,420 18
Improvements:	
Total expenditures on account of improvements and filtration contracts	\$329,340 32
	<hr/>
Total expenditures	\$2,600,760 50

*Bonds for the Improvement, Extension and Filtration of
the Philadelphia Water Supply, January, 1912.*

Date of Ordinance.	Total Loan	Amount for Water	Amount for Filtration	Per Cent. Rate Interest
April 1, 1890-----	\$4,600,000	\$645,000	-----	3
September 16, 1892----	1,000,000	1,000,000	-----	3
February 6, 1893-----	3,500,000	1,000,000	-----	4
April 3, 1894-----	3,000,000	360,000	-----	3½
June 18, 1895-----	1,200,000	960,000	-----	3
June 17, 1898-----	11,200,000	-----	3,700,000	{ \$8,400,000 at 3 1,400,000 at 3½
March 15, 1900-----	12,000,000	-----	12,000,000	
June 11, 1902-----	5,000,000	-----	1,800,000	3½
May 18, 1904-----	16,000,000	-----	5,000,000	3½
February 9, 1907-----	13,500,000	500,000	4,000,000	{ 6,000,000 at 4 125,000 at 3½
April 15, 1908-----	10,000,000	-----	800,000	
July 1, 1909-----	5,739,700	-----	725,000	4
April 21, 1911-----	2,300,000	-----	525,000	4
		\$4,465,000	\$28,050,000	
			4,465,000	
Total for water and filtration-----			\$32,515,000	

In addition to the above, \$500,000 was appropriated by Councils December 29, 1902, from the current funds, making the total amount appropriated for filtration \$28,550,000.

Of the funds appropriated directly for the improvement, extension and filtration of the water supply, the following amounts have been expended or charged off on account of pending contracts:

Paid on completed contracts.....	\$22,490,096 67
Paid on uncompleted contracts.....	1,440,556 55

Limits of uncompleted contracts, less payments..	\$423,855 37
Water Bureau	1,013,149 89
Land damages	876,435 55
Expenses, supplies, advertisements, etc.	508,351 64
Salaries and wages	1,604,634 36
Damages to property on account of pipe laying..	18,876 55
Reparing over pipe trenches	100,053 99
Available balances on hand.....	73,989 43
Total	\$28,550,000 00

Land Appropriated.

The land appropriated for filters and other works comprises 471,738 acres, divided as shown below. Under the caption, "Land Damages," is included the jurors' and experts' fees and other legal expenses incident to the land takings.

Section.	Acres appropriated.	Land damages and costs.
Upper Roxborough.....	34.578	\$78,788 66
Shawmont Pumping Station (account Bureau of Water).....	2.800	16,810 13
Belmont.....	60.572	351,664 39
Torresdale	343.500	323,737 18
Lardner's Point.....	9.525	40,250 21
Oak Lane.....	20.823	65,204 98
Total.....		\$876,435 55

Coal.

The total quantity of coal consumed at the several pumping stations, filter plants, etc., during the year was 201,452 tons, costing \$570,483.08, a decrease of 13,327 tons over the amount used in 1910, and a decrease in cost of \$59,639.87.

With this lower coal consumption there was pumped 415,411,000 gallons more of water than during 1910.

The regular pumping stations used a total of 160,968

tons, 12,405 tons less than in 1910, and pumped 116,044,866,000 gallons of water, an increase of 1,313,966,000 gallons over 1910. The High Service stations burned 4,583 tons of coal during the year, a decrease of 122 tons over that of 1910, and pumped 72,414,000 gallons more water.

The Low Service stations—filters—pumped 82,652,948,000 gallons, 947,052,000 gallons less than in 1910, and burned 29,105 tons of coal, 1,221 tons less than in 1910.

Coal Consumed for Pumpage.

Stations.	Coal—Tons.		Pumpage—M. Gals.	
	Increase.	Decrease.	Increase.	Decrease.
Fairmount	60			149
Spring Garden		988		
Belmont		4,761	412	
Queen Lane		732	1,437	
Shawmont		3,610	54	
Lardner's Point		2,314		616
Totals.....	60	12,405	1,908	765
High Service Stations.				
George's Hill		135	82	
Roxborough	220			13
Mt. Airy		79		3
Chestnut Hill		36		
Wentz Farm		92	7	
Totals.....	220	342	89	16
Low Service Stations.				
Roxborough		1,799		329
Torresdale	578			616
Totals.....	578	1,799		945
Grand totals	858	14,546	1,992	1,726

Pumping Station.

The total quantity pumped during the year was as follows, all by steam :

	Gallons.
Lardner's Point	74,613,508,000
Belmont	15,993,686,000
Queen Lane	15,542,662,000
Shawmont	9,895,010,000
George's Hill, high service	1,065,941,000
Roxborough, high service	1,491,542,000
Wentz farm, high service	416,763,000
Torresdale filters, low service	77,913,508,000
Roxborough filters, low service	4,739,440,000
Total	<u>201,672,060,000</u>

An increase over the pumpage of 1910 of 415,411,000 gallons.

The total cost of operation of all the pumping stations, including all labor, coal, supplies, repairs, etc., was \$1,302,142.45, a reduction over 1910 of \$85,647.93.

The principal items of operating cost for 1910 and 1911 were as follows:

	1911.	1910.
Labor	\$660,404 78	\$664,272 85
Transportation	984 79	888 56
Coal	552,045 95	613,736 09
Lubricants	15,078 83	14,462 05
Packing	16,649 11	23,149 71
Miscellaneous supplies	26,484 09	21,857 72
Material for repairs.....	30,494 90	49,423 40
	<u>\$1,302,142 45</u>	<u>\$1,387,790 38</u>

The coal consumption at the pumping stations during 1911 was 77,193 tons of pea coal, at an average price of \$3.27 per ton, and 117,463 tons of bituminous coal, at an average price of \$2.543 per ton.

The average price paid for coal for the pumping stations during 1911 was \$2.83 per ton.

The average cost of pumping one million gallons 100 feet high, for all the stations, for 1911, was \$4.03, showing a reduction of \$0.28 over 1910.

Lardner's Point.

The total pumpage for the year was 74,613,508,000 gallons. The cost of operation, including all labor, coal, supplies, and repairs, was \$426,845.94, divided as follows:

	Cost.	Pumpage—Gallons.
Engine House No. 1.....	\$32,238 92	927,590,000
Engine House No. 2.....	204,467 42	35,473,013,000
Engine House No. 3.....	190,139 60	38,212,905,000
Total	\$426,845 94	74,613,508,000

This shows a reduction in the operating expenses of \$17,614.61, and a decrease in the amount of water pumped of 615,852,000 gallons.

Engine House No. 1 is the old station, and is only used during the seasons of maximum consumption.

The machinery in Houses Nos. 2 and 3 is similar, excepting that most of the auxiliaries are in House No. 2, and a larger proportion of the administration expenses are charged to it. Each house contains six 20,000,000 gallon Holly vertical, triple expansion engines, all of which are in excellent condition.

The cost of pumping one million gallons one hundred feet high in No. 2 House was \$2.97, proportioned as follows: Labor, \$1.51; coal, \$1.26; oil, packing and supplies, \$0.20.

The same service in No. 3 House cost \$2.19 per million gallons, divided as follows: Labor, \$1.02; coal, \$1.02; oil, packing and supplies, \$0.15.

These costs are practically the same as for last year.

The daily average pumpage was 204,120,000 gallons.

The quantity of coal consumed was 70,888 tons, at an average cost of \$2.53 per ton, or \$179,494.24, showing a decrease over 1910 of 2,314 tons. The average price per ton paid during 1910 was \$2.63.

Torresdale.

The Torresdale Pumping Station is a low service plant, pumping water from the Delaware river to the preliminary filters.

The station contains the following machinery:

- Six R. D. Wood 40-million gallon centrifugal pumps, driven by compound vertical engines.
- One Allis-Chalmers 40-million gallon centrifugal pump, driven by a compound vertical Bates engine.
- One De Laval 50-million gallon centrifugal pump, driven by turbine engine.
- Three 150 K. W. generators, driven by De Laval turbine engines.
- Two 5-million gallon De Laval centrifugal pumps, driven by turbine engines, for preliminary filter wash water.
- One 2.5-million gallon De Laval centrifugal pump, turbine engine driven, furnishing water under 100 lbs. pressure for sand washing.
- One 3-million gallon Worthington compound duplex pump, for emergency use for sand washing.

The total cost of operating the station for the past year, including all labor, coal, supplies, repairs, etc., was \$164,968.09, or \$2.12 per million gallons of water pumped to the filters, and the average cost of raising one million gallons 100 feet high, based on the pumpage of the large centrifugal pumps, was \$5.04, divided as follows: Labor, \$2.69; coal, \$2.01; oil, packing and sundries, \$0.34. The average lift was 42 feet.

These costs include furnishing current for operating the four 80 H. P. motors connected to the air blowers in the pre-filters, and lighting all the filters and grounds, heating the pre-filter buildings, and operating the wash water

pumps, besides the regular auxiliaries of a station of this size.

The total pumpage for the year was 77,913,508,000 gallons, a decrease of 615,852,000 gallons over that of 1910.

The average daily pumpage was 213,500,000 gallons.

The six R. D. Wood & Company's centrifugal pumps have been accepted, and are proving very satisfactory.

The 50-million gallon DeLaval turbine driven centrifugal pump is in regular operation.

The total quantity of bituminous coal used was 26,055 tons, at a cost of \$65,704.20, showing an increase in the amount of coal consumed over that of 1910 of 465 tons.

Fairmount and Spring Garden.

The Fairmount Pumping Station was turned over to the Department of the Mayor by ordinance of Councils, approved March 16, 1911. The machinery is being removed, and an Aquarium has been established. Likewise, the Fairmount Reservoir was transferred to the Fairmount Park Commissioners as a site for an Art Gallery.

The Spring Garden Station has been out of service during the year, and is in the hands of a caretaker, awaiting such disposition as may be made of it in the future.

Belmont.

The total pumpage at the Belmont Station was 15,993,686,000 gallons by meter measurement, or an increase of 412,562,000 gallons over that of the preceding year.

The average daily pumpage was 43,800,000 gallons, showing an increase over 1910 of 1,112,000 gallons per day.

The total cost of operating the station, including all labor, supplies and repairs, was \$231,221.90.

There were used 35,081 tons of pea coal, costing \$111,557.58.

The average lift was 298.7 feet, and the total cost of operating the station was \$4.58 per million gallons 100 feet high, divided as follows: Labor, \$1.98; coal, \$2.21; oil, packing and sundries, \$0.39.

The consumption of coal was decreased by 4,761 tons over that of 1910, notwithstanding the increased amount of water pumped. There has been a very gratifying decrease in operating expenses in all items, and the station at the present time is in very good condition.

The rebuilding of the three 10-million gallon horizontal compound Gaskill pumps was completed, and they should be good for fifteen years' more service.

The two 10-million Bethlehem horizontal cross compound pumps have given good service during the year, and the decreased coal consumption is largely due to their economical engines and the renovating of the Gaskill pumps.

Queen Lane.

The total cost of operating this station, including all labor, coal, supplies and repairs (including the rebuilding of Engine No. 3), was \$167,758.92 for the year, representing a cost of \$4.28 for each million gallons raised 100 feet high, divided as follows: Labor, \$2.00; coal, \$2.06; oil, packing and sundries, \$0.22.

The average lift was 255.9 feet.

The total pumpage was 15,542,662,000 gallons by meter measurement, showing an increase of 1,436,739,500 gallons, or ten per cent., over that of 1910.

The average daily pumpage was 42,600,000 gallons.

The quantity of coal consumed was 24,366 tons, costing \$80,651.46, or a decrease of 732 tons over that of 1910, with an increased pumpage of ten per cent.

The increased economy is due to more careful attention to details, and the completion of the rebuilding of Engines Nos. 1, 2 and 3. No. 4 engine will be rebuilt in the same manner as were the others as soon as funds can be procured.

The boilers of this station have been condemned by the Bureau of Boiler Inspection, and the entire boiler plant will be replaced by water tube boilers as soon as an appropriation can be obtained.

Shawmont.

The total cost of operating this station for the year 1911, including all labor, coal, supplies and repairs, was \$190,908.55, or a decrease over that of the preceding year of \$21,974.55.

The cost per million gallons pumped 100 feet high was \$4.90, divided as follows: Labor, \$2.42; coal, \$2.12; oil, packing and sundries, \$0.36.

The average lift was 397.4 feet.

The total pumpage by meter measurement was 9,895,010,000 gallons, or an increase over that of the preceding year of 53,808,000 gallons.

The average daily pumpage was 27,100,000 gallons.

The quantity of coal consumed was 9,338 tons of pea coal and 20,520 tons of bituminous coal, costing \$82,546.16, a decrease of 3,610 in tons and \$17,357.59 in value over that used during 1910.

Three of the 5-million gallon Worthington high duty engines have been overhauled, and the fourth is well under way. The machinery at this station is in good condition.

High Service Stations.

The total pumpage at the High Service Stations was 2,974,246,000 gallons, showing an increase over 1910 of 72,414,000 gallons.

The following table shows the pumpage during 1911 at the several High Service Stations:

Stations.	Pumpage, gallons.	Increase, gallons.	Decrease, gallons.
Belmont, George's Hill.....	1,065,941,000	81,926,000	
Roxborough	1,491,542,000		12,615,000
Mt. Airy			3,412,000
Frankford, Wentz Farm.....	416,763,000	6,516,000	
Totals.....	2,974,246,000	88,442,000	16,027,000
Increase		72,414,000	

The Mt. Airy Pumping Station was closed for the entire year, and such pumpage as was required from this station will hereafter be furnished from the Roxborough High Service Station.

The Chestnut Hill Station has been dismantled, and the grounds and buildings turned into a playground for children.

At the Roxborough High Service Station an extension has been made to the boiler room, in which two steam boilers, taken from the Spring Garden works, have been installed.

Roxborough Low Service Station.

The total pumpage at this station was 4,739,440,000 gallons, or a decrease over that of the preceding year of 328,409,000 gallons.

Pumpage and Itemized Cost for 1911.

Stations.	Pumpage.	Average lift.	Labor.		Coal.		Oil, grease and waste.		Packing, rubber valves, etc.		Sundries.		Total cost of station.	Cost per M. G. 100 feet high.	Averages, 1910.
			Cost.	Per M. G. 100 feet high.	Cost.	Per M. G. 100 feet high.	Cost.	Per M. G. 100 feet high.	Cost.	Per M. G. 100 feet high.	Cost.	Per M. G. 100 feet high.			
†Fairmount.....	31,803,007		\$5,735 55	197 77			\$3 35	\$0 12			\$453 17	\$15 63	\$6,192 07	\$213 52	\$71 18
†Spring Garden.....			17,436 08		\$4,022 70		95 95		\$143 79		790 87		22,489 39		
Belmont.....	*15,993,685,845	315.17	99,959 22	1 98	111,557 58	\$2 21	3,234 36	06	5,403 36	\$0 11	11,067 38	22	231,221 90	4 58	5 39
Queen Lane.....	*15,542,662,500	252.43	78,580 99	2 00	80,651 46	2 06	2,272 95	06	1,049 50	08	5,204 02	13	167,758 92	4 28	4 69
Shawmont.....	*9,895,009,772	393.49	94,109 56	2 42	82,546 16	2 12	2,268 54	06	4,150 08	10	7,834 26	20	190,908 55	4 90	5 44
Lardner's Point No. 1.....	927,589,800	182.40	26,718 82	15 80	4,466 88	2 64	97 41	06	178 10	11	777 71	46	32,238 92	19 07	30 36
Lardner's Point No. 2.....	35,473,012,920	193.93	103,887 74	1 51	86,687 75	1 26	3,107 31	04	2,020 35	03	8,764 27	13	204,467 42	2 97	2 99
Lardner's Point No. 3.....	38,212,905,410	227.27	88,825 44	1 02	88,339 61	1 02	3,136 48	04	2,621 67	03	7,216 40	08	190,139 60	2 19	2 19
George's Hill.....	1,065,940,940	135.99	13,044 29	9 00	6,167 76	4 25	283 63	20	74 71	05	479 47	33	20,049 86	13 83	16 91
Roxborough H. S.....	1,491,542,080	117.53	21,398 50	12 21	7,292 70	4 16	187 21	11	315 04	18	3,376 02	1 92	32,570 07	18 58	18 67
Mt. Airy.....			2,379 52		206 25						26 53		2,612 30		1,733 11
Wentz Farm.....	416,763,200	140.59	11,690 15	19 95	3,270 40	5 58	178 51	30	31 51	05	784 72	1 34	15,955 29	27 22	27 76
Roxborough L. S.....	4,739,440,000	20.53	8,536 75	8 77	11,132 50	11 44	472 72	49	80 17	08	347 93	36	20,570 07	21 14	23 86
Torresdale.....	\$77,913,508,130	42.00	88,102 17	2 69	65,704 20	2 01	2,090 72	06	580 88	02	8,550 12	26	164,968 09	5 04	5 01
Totals and averages.....	201,703,863,604	160.38	\$660,404 78	\$2 04	\$552,045 95	\$1 71	\$17,369 14	\$0 06	\$16,649 11	\$0 05	\$55,673 47	\$0 17	\$1,302,142 45	\$4 03	\$4 31

*Meters. †Frankford, plus 275,000,000 gallons per month.

‡Fairmount and Spring Garden shut down February 15, 1909. Are kept in reserve.

Upper Roxborough Filters.

This station consists of a storage reservoir of 147,032,000 gallons capacity, giving a period of about 9.71 days' sedimentation, eight covered filter beds of a combined area of 5.6 acres and a covered clear water basin of 8,000,000 gallons capacity.

During the year there were filtered at this station 4,739,430,000 gallons of water, an average of 13,313,000 gallons per day, corresponding to an average rate of 2.38 million gallons per acre per day.

The total cost of operation was \$14,114.68, or \$2.98 per million gallons, of which the laboratory cost was 65 cents per million gallons filtered. This includes all the items connected with the operation of the station, but does not include the cost of pumping water from the storage reservoir or sedimentation basin to the filters.

Comparing the filtered water and the water flowing from the Upper Roxborough sedimentation reservoir, the reductions were as follows:

	Per cent.
Average reduction, turbidity	99.77
Average reduction, bacteria	98.96
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.88
Minimum reduction, turbidity	95.00
Minimum reduction, bacteria	93.00

Comparing the effluent from the filters with the water pumped from the Schuylkill river, the reductions were as follows:

	Per cent.
Average reduction, turbidity	99.91
Average reduction, bacteria	99.90
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.99
Minimum reduction, turbidity	95.83
Minimum reduction, bacteria	99.44

The total number of runs or cleanings during the year was 40, an average of five runs to each filter, the average time between scrapings being 61.84 days. The average amount filtered between cleanings was 111.52 million gallons, or 159.32 million gallons per acre.

The filters were washed for the entire year by the "Brooklyn" method. The cost of labor and wash water was 57 cents per million gallons of water filtered, and 1,870 gallons of wash water were required per million gallons filtered.

Last year but two methods were used, i.e., the Brooklyn and Nichols, and the results were as follows:

Brooklyn method, 33 runs.....average 41.55 days each
Nichols separators, 29 runs.....average 45.60 days each

The cost of labor and wash water was respectively 65 cents and 98 cents per million gallons of water filtered, and the average amount filtered between cleanings was 113.5 and 117.0 million gallons per acre. The wash water required was 2,144 and 2,370 gallons per million gallons filtered, respectively.

The storage reservoir from which these filters are supplied is so large that the water was subsided for an average of 9.71 days before going upon the filters. The results obtained from this sedimentation are very good. The average turbidity of the water before being stored was for the year 45, while the effluent from the reservoir averaged 17.

The percentage of reduction in turbidity was 62.2 per cent., and the reduction in bacteria from the above storage was 90.8 per cent. The maximum turbidity of the raw Schuylkill river water at the Roxborough station was 800, the minimum 5, and the average for the year 45.

The average bacteria in the Schuylkill river at Shaw-

mont location of the pumping station supplying water to this plant was 52,955, the minimum 1,200, and the maximum 640,000.

Lower Roxborough Filters.

This station consists of a storage reservoir of 12,838,000 gallons capacity, giving a period of 1.29 days' sedimentation; five covered filter beds, having a combined area of 265 acres; eleven preliminary filter tanks with a combined area of 0.2586 acres, and a covered clear water basin of 3,000,000 gallons capacity.

During the year there were filtered at this station 3,670,500,000 gallons of water, or a daily average of 10,056,000 gallons of water; corresponding to an average rate of 3.8 million gallons per acre per day. The filters were operated at rates between five and six million gallons per acre per twenty-four hours.

The total cost of operation, including the preliminary filters but not including the cost of the wash water, was \$20,369.72, or \$5.55 per million gallons filtered, of which the laboratory cost was 85.4 cents per million gallons filtered.

The preliminary filters were operated at an average rate of 45,220,000 gallons per 24 hours per acre, at a total cost of \$2.00 per million gallons of water filtered by the sand filters. The average turbidity of the applied water for the year was 32, and the effluent averaged 18, the average reduction in turbidity being 43.7 per cent. The removal of bacteria by the preliminary filters for the year averaged 44.7 per cent.

The maximum quantity filtered by the sand filters in one day was 11,423,000 gallons, equivalent to a rate of 5.08 million gallons per day per acre of area in service. The filters were washed for the entire year by the "Brooklyn" method. The total number of runs or wash-

ings of the sand filters for the year was 64, an average of 12.8 per filter. The average time between scrapings was 26.2 days, and the average amount filtered between cleanings was 57 million gallons, equivalent to 107.55 million gallons per acre.

There was no resanding during the year.

Comparing the filtered water and the effluent from the preliminary filters, the reductions for the past year were as follows:

	Per cent.
Average reduction, turbidity	99.41
Average reduction, bacteria	99.41
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.93
Minimum reduction, turbidity	96.43
Minimum reduction, bacteria	96.67

In the following table a comparison is made, showing the reduction of the bacteria and turbidity in the water received from the Schuylkill river. This is the work of the combined plant, consisting of a sedimentation basin (where the water is allowed to stand for an average period of 1.29 days), preliminary filters and the final filters:

	Per cent.
Average reduction, turbidity	99.82
Average reduction, bacteria	99.73
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.99
Minimum reduction, turbidity	97.22
Minimum reduction, bacteria	96.72

Belmont Filters.

The Belmont Filter Station is composed of a sedimentation basin of 70,000,000 gallons capacity, giving a period of 1.69 days' sedimentation; preliminary filters consisting of nine filter tanks, having a capacity of 40,000,000 gallons per 24 hours; 18 covered sand filters, having a com-

bined area of 13.53 acres, and a covered clear water basin with a capacity of 16,500,000 gallons.

The filters are operated at a nominal rate of 3,000,000 gallons per acre per 24 hours, and the total quantity filtered during the past year was 14,486,190,000 gallons, at an average yield of 39,690,000 gallons per day, corresponding to an average rate of 2.93 million gallons per acre per 24 hours.

The maximum amount of water filtered in any one day was 44,465,000 gallons, equivalent to a rate of 3.48 million gallons per acre per day of filters in service.

The preliminary filters were started on October 23, 1907. They are operated at a rate of 75,000,000 gallons per acre per 24 hours this year, and have materially increased the length of runs or time between scrapings of the slow sand filters without any decrease in efficiency.

The total cost of operation was \$42,041.50, or \$2.90 per million gallons filtered, which included a charge of \$7,623.20 for operation of the preliminary filters and \$4,804.43 for laboratory expenses, the cost of preliminary filtration being 52 cents per million gallons and the laboratory charge 33 cents per million gallons.

The reduction in turbidity and bacteria by the action of the preliminary filters was 44.4 per cent. and 48.0 per cent., respectively.

There were 151 runs or cleanings during the year; 142 of these runs were on filters cleaned by the Brooklyn method and nine by the other methods.

The average length of runs was 40.18 days, the amount filtered between runs being 94,146,000 gallons, or 125,194,000 gallons per acre.

While the length of runs and quantity filtered with the Brooklyn method was not so large as with the usual method, it proved economical on account of the short time

it was necessary to have the bed out of service, the low labor cost of cleaning and the saving in not having to replace the sand.

Seventeen filters were operated for the entire year by the Brooklyn method. The items of cost, etc., in the process of cleaning were as follows:

Number of runs	142.
Average length of runs, days.....	40.4
Average m. g. filtered per run.....	94.53
Average m. g. filtered per acre per run.....	125.71
Average cost of water to wash per m. g. filtered.....	0.05
Average cost of labor to wash and spade per m. g. filtered	0.55
Total cost of washing and spading sand in place (water and labor) per m. g. filtered.....	0.60
Average gallons water used to wash sand in place per m. g. filtered.....	4,109

One filter was operated during the year by the "Nichols Separators" method.

Number of runs.....	9.
Average length of runs, days.....	37.38
Average m. g. filtered per run.....	88.02
Average m. g. filtered per acre per run.....	117.05
Average cost of labor, scraping, raking and spading per m. g.	0.262
Average cost of labor washing per m. g. filtered.....	0.266
Average cost of water per m. g. filtered.....	0.02
Average cost per m. g. labor, spading, scraping, washing, water, etc.	0.55
Average gallons of water used to wash per m. g. filtered	1.336
Depth of sand scraped per run, inches.....	1.42
Cubic yards sand scraped per m. g. filtered.....	1.590
Daily average turbidity of applied water.....	14.0
Daily average bacteria in applied water.....	21.630

Comparing the effluent from the Belmont filters with the applied water, the reductions were as follows:

	Per cent.
Average reduction, turbidity	99.34
Average reduction, bacteria	99.19
Maximum reduction, turbidity	100.00

Maximum reduction, bacteria	99.95
Minimum reduction, turbidity	97.22
Minimum reduction, bacteria	93.03

Comparing the effluent from the plain sand filters and the water from the Schuylkill river, the reductions were as follows:

	Per cent.
Average reduction, turbidity	99.74
Average reduction, bacteria	99.66
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.99
Minimum reduction, turbidity	96.88
Minimum reduction, bacteria	98.58

During the year filtered water continued to be stored in the Georges Hill Reservoir, which has a capacity of 39,760,000 gallons. This reservoir is not covered, and determinations made weekly failed to show any ill effects from this open storage.

A Blaisdell Filter Washing Machine installed in 1909 for cleaning the preliminary filters has been in operation for the entire year, and has been of great benefit to the filters.

Queen Lane Filters.

This station consists of a sedimentation basin of 177,000,000 gallons capacity; a preliminary filter plant consisting of 40 concrete tanks, approximately 40 x 32 feet each, containing 1,280 feet of filtering surface; a final filter plant of 22 slow sand filter beds, 0.76 acre in area; a clear water basin of 50,000,000 gallons capacity; a pumping station containing wash water pumps, air compressors and generators.

The plant was put in service about November 29, 1911, and has been operating at about 47,000,000 gallons daily. No results are given on account of the short period the plant has been in service.

Torresdale Filters.

The Torresdale Filter Station consists of sixty-five 0.75 acre covered beds, a covered clear water basin of 50,000,000 gallons capacity, preliminary filter plant consisting of 120 concrete tanks, approximately 60 x 20 feet each, containing 1,140 square feet of filtering surface, with a capacity of 240,000,000 gallons of water per 24 hours; a low lift pumping station, containing eight 40,000,000 gallon centrifugal pumps; three 150 K. W. generators and four sand washing pumps, with full complement of boilers, economizers, mechanical stokers, etc.

The total amount of water filtered during the year was 76,047,640,000 gallons, an increase of 137,150,000 gallons over that of 1910. The daily average was 208,350,000 gallons, equivalent to an average rate of 4.27 million gallons per acre per day.

The entire cost of operation, not including the expenses of the low lift pumping station, or the cost of the wash water, which are included in the expenses of the pumping station, and which amounted to \$2.17 per million gallons of water filtered, was \$126,325.14, or \$1.66 per million gallons of water filtered, making the total expense of pumping the water from the river and filtering it, \$3.83 per million gallons filtered, a reduction of 16 cents over 1910.

Of this amount \$21,294.64 was for operating the preliminary filters, and \$12,743.11 the cost of the laboratory, or \$0.28 and \$0.168 per million gallons filtered.

The filters are operated at rates approximating 6,000,000 gallons per day per acre.

The maximum amount filtered in any one day was 237,045,000 gallons, equivalent to an average rate of 5.09 million gallons per acre per day for the area in service.

The total number of runs or cleanings was 613, a decrease of 38 over 1910, less than ten cleanings per filter

per year, and an average length between cleanings of 35.33 days, an increase of 1.68 days over the previous years.

The standard method of cleaning adopted for 1911 was washing the sand in the filters by ejectors and Nichols Separators, the cost of which was as follows:

Number of cleanings by Nichols method.....	613.
Average length of runs, days.....	35.31
Average million gallons filtered per run.....	121.21
Average million gallons filtered per acre per run.....	161.61
Cost of water to wash per million gallons.....	0.01
Cost to rake, scrape and wash per million gallons, labor.	0.62
Total cost to clean	0.63
Average gallons water used to wash per millions gallons.	1,924.
Cubic yards scraped per million gallons filtered.....	1.62
Average turbidity of applied water.....	5.
Average bacteria in applied water.....	2,610.

The resanding was done during the year by Bureau labor, using Nichols Separators. There were replaced 11,017 cubic yards in filters Nos. 5, 12, 29, 31, 33, 40, 43, 44, 46, 48, 50, 56, 63 and 65, at a cost of \$0.306 per cubic yard.

Comparing the effluent from the Torresdale final filters with the water taken from the Delaware river, the reductions were as follows:

	Per cent.
Average reduction, turbidity	99.58
Average reduction, bacteria	99.67
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.94
Minimum reduction, turbidity	97.62
Minimum reduction, bacteria	98.38

The Torresdale preliminary filters were placed in service on January 21, 1909, and since this date all water filtered by the sand filters has passed through these filters. They normally filter at the rate of 80,000,000 gallons per acre per day, but have given satisfactory results from rates of 100,000,000 gallons per acre per day. The daily aver-

age reductions in turbidity and bacteria for the year were 66.98 and 65.45 per cent., respectively.

The average turbidity of the applied water to the pre-filters was 16 and the maximum 97. The per cent. of wash water used for the year averaged 0.57 per cent. of the amount filtered.

The number of cleanings for the pre-filters was 22,763, an average of 190 cleanings to each filter, or about 1.9 days between cleanings for the year.

The total amount pre-filtered was 79,849 million gallons, requiring 455 million gallons of wash water.

Cost of Operation of Filters for 1911.

	Upper Roxboro.	Lower Roxboro.	Belmont.	Torresdale	Totals.
Office -----	\$1,583 42	\$1,589 18	\$2,935 49	\$6,145 61	\$12,253 70
Filter attendants ----	2,630 33	1,228 99	2,470 47	11,692 25	18,022 04
Cleaning filters -----	4,885 63	4,137 48	12,972 02	55,876 63	77,371 76
Labor on grounds-----	189 17	263 75	552 82	4,004 67	5,010 41
Janitors and watch- men-----	1,158 84	1,185 02	1,465 10	1,836 00	5,644 96
Maint. and repairs----	899 74	1,436 96	4,283 90	6,151 87	12,771 97
Laboratory -----	8,100 14	8,184 95	4,804 43	12,748 11	23,782 63
Lighting -----	167 41	41 69	4,984 07	8,821 67	8,964 84
Treatment -----				2,759 19	2,759 19
Totals for final filters.	\$14,114 68	\$18,018 02	\$34,418 30	\$105,030 50	\$166,581 50

Pre Filters

	Upper Roxboro.	Lower Roxboro.	Belmont.	Torresdale	Totals.
Filter attendants ----		\$1,225 13	\$2,430 88	\$12,563 94	\$16,269 95
Labor -----				2,766 38	2,766 38
Maint. and repairs----		6,126 57	5,142 32	5,964 32	17,233 21
Totals for pre-filters.		\$7,351 60	\$7,623 20	\$21,294 64	\$36,269 44
Low service station----	\$20,570 07				\$20,570 07
Total cost of plant---	\$34,684 75	\$20,369 62	\$42,041 50	\$126,325 14	\$223,421 01
Million gallons filtered	4,739.43	3,670.50	14,486.19	76,047.64	98,943.76
Cost per million gals.:					
Final filters-----	\$2 96	\$3 55	\$2 38	\$1 38	\$1 68
Pre-filters -----		2 00	52	28	38
Pumping station----	4 34				4 34
Total cost per M. G---	\$7 32	\$5 55	\$2 90	\$1 66	\$2 26

Comparison of Pumpage for 1910 and 1911.

	GALLONS			
	1910.	1911.	Increase	Decrease
Annual pumpage from rivers.....	114,938,585,836	116,076,669,254	1,138,083,418	
Average daily pumpage from rivers.....	314,900,235	318,018,272	3,118,037	
Pumpage per capita per day.....	203.2	201.6		1.6
Maximum daily pumpage from rivers during month of greatest consumption...	352,124,270	347,634,430		4,489,840
Pumpage per capita during month of greatest consumption.....	219.3	209.6		9.7
Total supplementary pumpage at high service stations.....	7,969,681,140	7,713,686,220		255,994,920
Torresdale station, low service pumpage from Delaware river.....	78,529,359,650	77,913,508,130		615,851,520

Meters at Roxborough, Belmont and Queen Lane stations, plunger displacement at other stations.

*Volume and Cost of Direct Pumpage for the Years 1901
to 1911 Inclusive.*

Years.	Number of gallons pumped.	Number of gallons pumped 100 feet high.	Cost per million gallons pumped 100 feet high.	Gallons pumped per capita per day.	Population, estimated.
1901.....	101,836,624,004	208,180,044,733	\$3 58	211.1	1,321,304
1902.....	114,460,164,379	236,842,612,454	3 99	232.0	1,349,500
1903.....	119,600,619,200	244,997,189,170	4 64	238.0	1,378,298
1904.....	120,398,160,615	247,368,530,966	5 04	234.0	1,407,690
1905.....	119,483,641,811	257,447,392,820	4 93	227.7	1,437,730
1906.....	116,732,206,859	253,264,725,466	4 42	217.8	1,468,411
1907.....	110,406,858,007	238,268,054,129	4 86	201.7	1,499,747
1908.....	117,885,662,022	256,334,927,765	5 44	210.2	1,531,752
1909.....	111,129,767,510	277,020,429,051	4 12	196.2	1,552,000
1910.....	†114,939,585,836	284,227,631,428	3 93	203.2	†1,549,000
1911.....	†116,076,669,254	285,932,295,175	3 65	201.6	1,577,000

†Meters used at Belmont, Queen Lane and Roxborough.

†U.S.Census.

*Volume and Cost of High Service Pumpage for the Years
1901 to 1911 Inclusive.*

Years.	Number of gallons pumped.	Number of gallons pumped 100 feet high.	Cost per million gallons pumped 100 feet high.
1901.....	1,968,833,130	2,276,802,775	\$17 86
1902.....	2,338,280,121	2,855,932,559	18 02
1903.....	2,484,635,469	3,119,047,064	17 01
1904.....	2,309,693,874	2,904,640,639	18 07
1905.....	2,231,646,920	2,847,970,028	18 04
1906.....	2,195,711,849	2,821,442,386	25 56
1907.....	2,681,156,615	3,307,403,147	18 88
1908.....	3,008,496,156	3,781,371,423	27 76
1909.....	3,202,300,942	4,017,996,696	18 74
1910.....	2,901,832,140	3,678,944,116	19 80
1911.....	2,974,246,220	3,788,556,376	18 78

*Volume and Cost of Low Service Pumpage for the Years
1901 to 1911 Inclusive.*

Years.	Number of gallons pumped.	Number of gallons pumped 100 feet high.	Cost per million gallons pumped 100 feet high.
1901			
1902			
1903	*1,930,680,000	652,569,840	\$8 63
1904	3,485,172,000	940,996,440	13 71
1905	3,652,158,445	986,082,780	14 95
1906	4,380,947,000	1,182,855,690	13 02
1907	†12,534,198,000	2,895,132,432	17 16
1908	39,370,537,000	8,306,843,417	14 02
1909	‡80,171,636,350	32,865,400,640	5 27
1910	‡83,597,208,650	34,090,119,574	5 62
1911	82,652,948,130	33,696,370,153	5 65

*Roxborough Low Service station, started July 3, 1903.

†Torresdale Station, started July 15, 1907.

‡Frankford plus 8,300,000,000 gallons—Torresdale.

*Cost of Raising 1,000,000 Gallons 100 Feet during 1910
and 1911.*

Pumping Stations	1910.	1911.	Increase	Decrease
Fairmount -----	\$71 18	\$213 52	\$142 34	
Spring Garden -----				
Belmont -----	5 39	4 53		\$0 81
Queen Lane -----	4 69	4 23		41
Shawmont -----	5 44	4 90		54
Lardner's Point No. 1 -----	30 36	19 07		11 29
Lardner's Point No. 2 -----	2 99	2 97		02
Lardner's Point No. 3 -----	2 19	2 19		
Average -----	\$3 93	\$3 65		\$0 28
High Service Stations.				
George's Hill -----	\$16 91	\$13 83		\$3 08
Roxborough -----	18 67	18 56		09
Mt. Airy -----	1,733 11			1,733 11
Wentz Farm -----	27 76	27 22		54
Average -----	\$20 85	\$18 78		\$2 07
Low Service Stations.				
Roxborough -----	\$23 86	\$21 14		\$2 72
Torresdale -----	5 01	5 04	03	
Total averages -----	\$4 31	\$4 03		\$0 28

Comparison of the Capacity and Average Daily Pumpage for 1910 and 1911.

Pumping Stations.	Capacity.		Average.	
	1910.	1911.	1910.	1911.
Fairmount	33,290,000	33,290,000	495,830	87,131
Spring Garden	170,000,000	170,000,000	-----	-----
Belmont	67,000,000	67,000,000	42,688,010	43,818,317
Queen Lane	80,000,000	80,000,000	33,646,363	42,582,637
Shawmont	51,500,000	51,500,000	26,962,224	27,109,616
Total from Schuylkill.....	401,790,000	401,790,000	108,792,427	113,597,701
Increase.....	-----	-----	-----	4,805,274
Decrease.....	-----	-----	-----	-----
Lardner's Point No. 1.....	57,000,000	57,000,000	1,594,509	2,541,342
Lardner's Point No. 2.....	120,000,000	120,000,000	97,328,978	97,186,337
Lardner's Point No. 3.....	120,000,000	120,000,000	107,186,347	104,692,891
Total from Delaware.....	297,000,000	297,000,000	206,107,834	204,420,570
Increase.....	-----	-----	-----	-----
Decrease.....	-----	-----	-----	1,687,234
Total from Delaware and Schuylkill rivers	698,790,000	698,790,000	314,900,261	318,018,271
Increase.....	-----	-----	-----	3,113,010
Decrease.....	-----	-----	-----	-----
High Service Stations.				
George's Hill	11,000,000	11,000,000	2,695,916	2,920,383
Roxborough	10,000,000	10,000,000	4,120,982	4,086,413
Mt. Airy	3,000,000	3,000,000	9,354	-----
Wentz Farm	7,000,000	7,000,000	1,123,973	1,141,817
Total high service.....	31,000,000	31,000,000	7,950,225	8,148,619
Increase.....	-----	-----	-----	198,394
Decrease.....	-----	-----	-----	-----

Comparison of the Capacity and Average Daily Pumpage for 1910 and 1911—Continued.

Pumping Stations.	Capacity.		Average.	
	1910.	1911.	1910.	1911.
Low Service Stations.				
Roxborough -----	30,000,000	30,000,000	13,884,517	12,984,767
Torresdale -----	325,000,000	325,000,000	215,148,931	213,461,666
Total low service.....	355,000,000	355,000,000	229,033,448	226,446,433
Increase.....				
Decrease.....				2,587,015
Total daily -----	1,064,790,000	1,084,790,000	551,883,934	552,613,323
Increase.....				729,389
Decrease.....				

The following appendices accompany this report:

- A—Report of Chief Clerk.
- B—Report of General Superintendent.
- C—Report of Assistant in Charge of Distribution.
- D—Report of Registrar.
- E—Report of Superintendent of Construction and Repair Shop.
- F—Report of Chief Draftsman.

Distribution.

The total quantity of pipe laid during the year was 142,116 feet, of which 136,286 feet were service mains from four to sixteen inches in diameter, and 5,830 feet fire hydrant and other connections.

The total length of new pipe added was 140,599 feet, equal to 26.63 miles, making 1,704.74 miles now in use, of which 40.51 miles represent pipe laid under the improvement, extension and filtration of the water supply, not previously reported.

The total quantity of pipe laid includes 6,986 feet laid by private contract, permission for which was given by authority of ordinance of Councils at a time when the Bureau had neither the pipe nor funds with which it could be purchased.

The number of additional fire hydrants put in during the year was 281, making the total number now in use 16,569.

The total number of drills for attachments, from one-half to six inches in diameter, was 8,230.

The total number of meters in use was 2,036.

The total number of dwellings with water was 324,727, an increase of 9,401 during the year.

I wish here to testify to the faithful and valuable services rendered the City by the employees of the Bureau,

and it was only by their efforts that the supply of water, both as to quality and quantity, was maintained sufficiently to meet the demand.

Thanking you for the valuable assistance and support given me, I am,

Yours very respectfully,

FRED. C. DUNLAP,
Chief of Bureau.

APPENDIX A

REPORT OF CHIEF CLERK

Philadelphia, January 17, 1912.

MR. FRED. C. DUNLAP,
Chief, Bureau of Water.

DEAR SIR:—I have the honor to submit herewith detailed statement of the expenditures of the Bureau for the year 1911.

Yours respectfully,

J. T. HICKMAN,
Chief Clerk.

Detailed Expenditures of the Bureau for 1911.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
An ordinance to make an appropriation to the Bureau of Water, approved December 31, 1910—	\$1,024,151 00			
Balance from books of 1910	369,055 82			
Increased by additional appropriations and transfers	1,071,328 95			
	\$2,464,535 77			
Diminished by transfers	64,554 39			
Net appropriation		\$2,399,981 38		
Item 1. Salaries....	\$599,055 00			
Increased by additional appropriation	1,350 00			
	\$600,405 00			
Diminished by transfer	66,255 75			
Net appropriation		534,149 25		
Chief of Bureau		\$10,000 00		
Chief clerk and assistants		5,000 00		
Registrar		2,400 00		
Correspondence clerk		1,000 00		
Stenographers		3,600 00		
Time clerk		583 31		
Messenger		720 00		
Draughtsman		4,135 51		
Superintendent and assistant		4,975 57		
Paymaster and assistant		2,148 39		
Assistant clerks		3,600 00		
Assistants to chief		6,300 00		
Clerks		3,819 90		
Pipe inspector and clerk		2,500 00		
Search clerk		1,300 00		
Chief inspector		1,200 00		
Inspectors		17,338 32		
Permit clerk and assistant		2,500 00		
Purveyors		10,113 48		
Purveyors' clerks		6,298 79		
Purveyors' assistant clerks		5,213 48		
Yardkeeper		815 00		
Yardman, from May 1st		600 00		
Hydrant inspectors		8,000 00		
General foremen		8,370 87		
Foreman of repairs		7,650 00		
Superintendent of shop and clerk		2,275 00		
Stop attendants		2,000 00		
General storekeeper		916 63		
Assistant in charge of boilers, from July 1st		625 00		
Foreman machinist		2,000 00		
Foreman bricklayer		1,600 00		
Foreman of City shop		1,400 00		
Foreman carpenter		1,200 00		
Foreman plumber		1,000 00		
Foreman painter		997 02		
Foreman rigger and assistants		1,900 00		
Watchmen		4,748 00		

Detailed Expenditures of the Bureau for 1911—Continued.

General appropriation.	Amount appro- priated.	Amount expended.	Amount merging.	Amount not merging.
Janitor, main office.....		\$720 00		
Lineman		1,200 00		
Telephone operators		1,600 00		
Salaries at stations:				
Fairmount		4,461 94		
Spring Garden		15,232 27		
Belmont		52,814 00		
George's Hill		8,109 80		
Queen Lane		23,912 41		
Mt. Airy		1,349 72		
Shawmont		45,547 43		
Roxborough High Service.....		13,042 47		
Lardner's Point		113,400 83		
Wentz Farm		9,707 56		
Torresdale		34,533 22		
Belmont Filters		13,960 00		
Upper Roxborough Filters.....		5,416 13		
Lower Roxborough Filters.....		6,186 02		
Torresdale Filters		31,336 96		
Uniforms for policemen and watchmen.....		1,800 00		
Deficiency salaries		128 53		
		\$530,398 76	\$3,750 49	
Item 1b. For the same purpose as Item 1.				
Balance, January 1.....	\$35 07			
Diminished by transfer..	35 07			
Item 1½. To pay deficiency bills of 1910, ordinance March 30.....	\$8,192 77	\$8,099 78	\$92 99	
Item 2. For wages of mechanics, labcrers and other workmen employed upon repairs to ma- chinery and the maintenance of and repairs to buildings, grounds and reservoirs, and the transportation of work- men incident thereto.				
Provided, That the union rate of wages be paid	\$150,000 00			
Increased by addition- al appropriations.....	185,000 00			
Net appropriation to item.....	335,000 00			
Transportation		893 87		
Wages:				
Boilermakers		13,344 52		
Bricklayers		11,808 11		
Carpenters		14,448 00		
Crane runner		1,413 50		
Diver		1,115 61		
Helpers		11,229 04		
Horses, carts and men.....		4,220 92		
Laborers		196,859 50		
Machinists		63,476 76		
Painters		5,109 74		

Detailed Expenditures of the Bureau for 1911—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Wages:				
Pump erector -----		\$1,252 86		
Tinsmiths -----		2,093 19		
Waste water inspection -----		79 84		
		\$327,945 46	\$7,064 54	
Item 3. For the wages of mechanics, drillers, laborers and other workmen connected with repairs to and improvement of the distribution and the laying of service mains, the transportation of workmen engaged in repairs and the traveling expenses of pipe inspectors -----				
\$150,000 00				
Increased by additional appropriations and transfers -----				
165,000 00				
Net appropriation to item -----	\$315,000 00			
Transportation -----		\$4,589 15		
Traveling expenses -----		494 28		
Wages:				
Improvement -----		75,289 56		
First District -----		31,414 21		
Second District -----		30,278 55		
Third District -----		48,697 97		
Fourth District -----		19,645 21		
Fifth District -----		26,113 56		
Sixth District -----		31,606 45		
Seventh District -----		39,516 14		
		\$307,645 08	\$7,354 92	
Item 3b. For the same purpose as Item 3.				
Balance January 1 -----	\$92 62			
Diminished by transfer -----	92 62			
Item 4. For wages of mechanics' helpers and other workmen at the City construction and repair shop -----				
\$20,000 00				
Increased by additional appropriations and transfers -----				
20,000 00				
Net appropriation to item -----	\$40,000 00			
Wages:				
Blacksmith -----		\$4,398 79		
Blacksmiths' helpers -----		3,791 33		
Driver -----		788 06		
Engineer -----		948 50		
Laborers -----		1,859 93		
Machinists, first class -----		16,287 52		
Machinists, second class -----		1,567 18		
Machinists' helpers -----		4,602 71		
Patternmakers -----		4,471 00		
		\$38,715 08	\$1,284 92	

Detailed Expenditures of the Bureau for 1911—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 4b. For the same purpose as Item 4.				
Balance January 1.....	\$299 89			
Driver		\$33 75		
Machinists		286 14		
		\$299 89		
Item 5. For the wages of the Hydrographic Corps		1,596 00		
Item 6. For repairs to boilers and machinery \$5,000 00 Increased by additional appropriations and transfers 3,500 00 Net appropriation to item.....	8,500 00			
Blowers		124 61		
Boiler		216 00		
Brass rod		34 53		
Bronze castings		30 24		
Bushings		70 03		
Copper pipe, etc		63 80		
Conveyer belt		118 50		
Cross and cylinder heads		42 50		
Cup leathers		88 56		
Drills		10 80		
Electric repairs		17 00		
Flywheel		386 00		
Fire bricks		146 50		
Freight		23 31		
Gauges		51 00		
Iron castings		74 27		
Iron fittings		358 74		
Link locks		15 65		
Machine work		741 35		
Overtopping buckets		240 00		
Pistons		67 40		
Repairs, boilers		74 90		
Repairs, economizer		785 65		
Repairs, machinery		515 38		
Spring regulators		23 80		
Steam trap		24 25		
Steel plates		91 95		
Steel springs		32 98		
Tile		35 00		
Valves		55 00		
		\$4,559 66	\$3,940 34	
Item 7. For hauling pipe and machinery	\$2,500 00	1,965 67	534 33	
Item 7b. For the same purpose as Item 7.				
Balance January 1st.....	4,000 00	1,088 50		\$2,961 50
Item 8. For repairs to roofs....	500 00	499 91	09	
Item 8½. For the same purpose as Item 8.				
Balance January 1st.....	\$75 00			
Diminished by transfer....	75 00			

Detailed Expenditures of the Bureau for 1911—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 9. For clerk hire in writing up duplicates.....\$3,000 00				
Increased by additional appropriations ----- 1,793 82				
Net appropriation to item.....	\$4,793 82	\$3,593 82	\$1,200 00	
Item 10. For keep of automobile for Chief of Bureau and keep of horse for General Superintendent and Assistant to Chief -----	2,000 00	2,000 00		
Item 11. For advertising, postage, horseshoeing, miscellaneous expenses, repairs to wagons, carts, harness, tools, pipe, pavements and incidental expenses, ground rent of 913 Cherry street, and electric current.....\$2,000 00				
Increased by additional appropriation and transfer ----- 4,500 00				
Net appropriation to item.....	6,500 00			
Advertising -----		287 75		
Binding and printing books.....		322 40		
Cleaning cesspool -----		30 00		
Electric current -----		95 40		
Engineer supplies -----		98 91		
Ground rent -----		26 66		
Gum goods -----		5 40		
Hardware -----		8 80		
Hauling sick horse -----		5 00		
Hire of automobile.....		5 00		
Horse medicine -----		3 00		
Horseshoeing -----		1,751 19		
Incidentals -----		60 80		
Incidentals, hydrographic.....		43 95		
Maps -----		133 50		
Morning papers -----		15 60		
Office supplies -----		79 27		
Oxygen -----		144 00		
Permit cards -----		43 30		
Photographic supplies -----		64 64		
Postage -----		795 48		
Professional services, V. S. -----		185 75		
Printing -----		53 30		
Repairs, electrical -----		29 20		
Repairs, harness -----		266 00		
Repairs, locks -----		3 00		
Repairs, range -----		2 10		
Repairs, pipe -----		55 78		
Repairs, thermometer -----		11 50		
Repairs, typewriters -----		12 10		
Repairs, wagons -----		650 45		
Rent of disinfector -----		144 00		
Rent of fire extinguisher.....		90 00		
Rent of telephone.....		748 91		
Rent of telephone mouthpieces.....		19 20		
Stationery -----		70 16		
Subscription, periodicals.....		29 00		

Detailed Expenditures of the Bureau for 1911—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Supporting tracks -----		\$27 57		
Tables for office -----		38 00		
Text books -----		15 00		
Telegrams -----		1 52		
Use of dump -----		5 00		
		\$6,437 59	\$62 41	
Item 12. For hauling ashes from pumping stations ----- \$3,000 00				
Increased by additional appropriations ----- 3,205 00				
Net appropriation to item -----	\$6,205 00	\$6,205 00		
Item 13. For the purchase of material connected with repairs to machinery, mains buildings, sidings and reservoirs ----- \$2,500 00				
Increased by transfer --- 1,000 00				
Net appropriation to item -----	3,500 00			
Air regulator -----		9 80		
Angle iron -----		18 00		
Asphalt boiler -----		91 50		
Brass fittings -----		43 20		
Carbon brushes -----		30 75		
Copper gaskets -----		6 00		
Copper pipe -----		157 11		
Copper sulphite -----		17 50		
Couplings -----		86 50		
Drill heads and cutters -----		32 60		
Electrical material -----		3 20		
Fittings -----		143 90		
Flanged ell -----		13 50		
Freight -----		23 07		
Grate bars -----		15 40		
Hardware -----		51 13		
Iron cloth -----		6 07		
Iron cornice -----		47 00		
Load chain -----		6 78		
Lumber -----		69 10		
Metal pencils -----		7 50		
Milling saw -----		6 42		
Packing -----		17 50		
Packing rings -----		52 50		
Parts of meters -----		652 92		
Paste -----		9 50		
Piston -----		3 18		
Piston rings -----		6 50		
Recording cards -----		15 25		
Repairs, calometer -----		8 75		
Repairs, electrical -----		173 95		
Repairs, gauges -----		134 25		
Repairs, machinery -----		32 61		
Repairs, pump -----		17 68		
Repairs, pyrometer -----		9 50		
Repairs, scales -----		203 50		
Repairs, siding -----		31 28		
Repairs, testing machine -----		20 76		
Repairs, tube cleaner -----		3 00		
Rubber caps -----		6 00		

Detailed Expenditures of the Bureau for 1911—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 13—Continued.				
Scale		\$185 00		
Screens		16 20		
Steam hose		83 00		
Soil pipe		18 89		
Steel		11 61		
Steel bars		11 34		
Steel castings		11 16		
Steel pipe		7 25		
Supporting tracks		16 05		
Tarvia		43 47		
Tube springs		43 85		
Valves		191 49		
		\$2,872 57	\$627 43	
Item 14. For wages of mechanics, laborers and other workmen employed in the maintenance and operation of Upper Roxborough, Lower Roxborough, Belmont and Torresdale Filter Stations, the Belmont and Torresdale Laboratories and the Torresdale Pumping Station				
Station	\$80,000 00			
Increased by additional appropriation.....	90,000 00			
	\$170,000 00			
Diminished by transfer	1,000 00			
Net appropriation to item.....	\$169,000 00			
Belmont Filters		15,001 25		
Lower Roxborough Filters.....		7,290 87		
Upper Roxborough Filters.....		5,565 00		
Torresdale Filters		134,584 79		
		\$162,441 91	6,558 06	
Item 15. For resanding the filters, painting and incidental expenses for operating filter plants				
filter plants	\$3,000 00			
Increased by additional appropriation	2,000 00			
Net appropriation to item.....	5,000 00			
Acid gloves		2 70		
Buckets		2 78		
Breeze		493 50		
Castings		34 80		
Cedar tanks		114 30		
Cotton batting		11 75		
Fittings		32 50		
Gas for fuel		575 00		
Incidentals		361 87		
Laboratory supplies		85 29		
Lightering		109 98		
Packing		67 00		
Separator		250 00		
Shifting cars		18 00		
Slag		25 00		
Stirrer wheel		139 84		
Transportation		245 00		
Waterproofing		51 00		
		\$2,620 31	\$379 66	\$2,000 00

Detailed Expenditures of the Bureau for 1911—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 16. For the completion of High Pressure Fire System.				
Balance January 1st.....	\$18 75			
Diminished by transfer.....	18 75			
Item 17. Sand for filtration purposes, Torredale beds.				
Balance January 1st.....	\$2,608 62			\$2,608 62
Item 18. For the purchase of and repairs to boilers and machinery.				
Balance January 1st.....	64,720 04			
Centrifugal pump		19,760 31		
Pump ends		900 00		
Repairs to pump, Belmont.....		8,497 08		
Repairs to pump, Queen Lane.....		28,715 79		
Repairs to pump, Roxborough.....		1,636 29		
Repairs to pump, Torredale.....		209 63		
		\$54,720 04		\$10,000 00
Item 19. Extension of Fire Main System.				
Balance January 1st.....	\$370 81			370 81
Item 20. For the improvement, extension and filtration of the water supply.				
Balance January 1st.....	84,765 46			
Hypochlorite of lime.....		3,400 00		
Pumping machinery, Torredale		64,383 43		
Reconstruction of engine, Queen Lane		9,928 57		
		\$77,712 00		7,053 46
Item 21. For the improvement, extension and filtration of the water supply.				
Balance January 1st.....	6,649 37			
Affidavits		21 00		
Clam-shell buckets		496 25		
Freight		133 08		
Prime bleach		107 65		
Pyrometer		56 00		
Repairs, engine, Queen Lane.....		2,326 77		
Supporting trac's		183 42		
Traveling expenses, inspectors.....		135 92		
Salaries		217 73		
		\$3,677 82		2,971 55
Item 22. For furnishing and laying mains and other purposes connected with the improvement, extension and filtration of the water supply.				
Balance January 1st.....	\$6,144 64			
Reconstruction of engine, Queen Lane		\$6,144 64		

Detailed Expenditures of the Bureau for 1911—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 23. For the construction of a filter plant at the Queen Lane Reservoir.				
Balance January 1st.....	199,208 85			
Fittings.....		48 00		
Hypochlorite of lime.....		1,821 44		
Machinery.....		31,638 00		
Traveling expenses, inspectors.....		165 00		
Waterproofing.....		26 00		
Wages.....		2,408 00		
Salaries.....		21,068 06		
		\$57,164 50		\$142,088 85
Item 24. To pay Costello & Co. for hauling ashes from the Lardner's Point Pumping Station, ordinance February 9, 1911				
Hauling ashes.....	1,500 00	1,500 00		
Item 25. For the completion of the Queen Lane Filter Plant, ordinance May 25, 1911				
Chain hoist.....	525,000 00	33 50		
Construction of filters.....		108,536 33		
Hire of automobiles.....		80 00		
Hose.....		467 00		
Office furniture.....		193 20		
Separator.....		3,050 00		
Tools.....		151 68		
Salaries.....		9,310 97		
		\$181,822 68		343,177 32
Item 26. To authorize the Department of Public Works to draw, and the City Controller to countersign, a warrant in favor of Cunningham & Murray for additional work on filtration pipe distribution system contract, and authorizing a transfer from the annual appropriation to the Bureau of Highways to the Bureau of Water, ordinance Nov. 11, 1911				
To pay bills of East Jersey Pipe Co., James McNeill & Bro. Co. and the Carroll-Porter Boiler and Tank Co., ordinance Dec. 29, 1911	6,299 40			
Net appropriation to item.....	62,287 36			
Rivets.....		\$6,209 40		\$56,077 96

Summary.

Balance from books of 1910.....	\$369,055 82
Additional appropriations and transfers.....	1,071,328 95
Annual appropriation	1,024,151 00
Total	\$2,464,535 77
Expended for improvements	\$329,340 32
Expended for maintenance.....	1,468,545 65*
Amount merging	32,840 34
Transferred	64,554 39
Amount not merging.....	569,255 07
Total	\$2,464,535 77

* Does not include Department of Supplies amount, \$802,874.53.

APPENDIX B**REPORT**

OF THE

GENERAL SUPERINTENDENT

SUBMITTING

TABLES OF EXPENSES, PUMPAGE AND CONSUMPTION OF
WATER DURING 1911

Philadelphia, January 1, 1912.

FRED. C. DUNLAP, Esq.,
Chief, Bureau of Water.

SIR:—I respectfully submit the following report on the operations and expenses in connection with the work performed at the several pumping stations during 1911, with tables showing the several items of expenditures and the details of pumpage, etc.

Very respectfully yours,
ALLEN J. FULLER,
General Superintendent.

Coal Purchased and Consumed, 1911.

STATION	Classification	Price per ton	Purchased			Consumed		
			Tons	Cost	Total	Tons	Cost	Total
Fairmount -----	Egg-----	\$5 40				80	\$324 00	\$324 00
Spring Garden -----	Pea-----	3 18	1,405.65	\$4,469 97	\$4,469 97	1,235	4,022 70	4,022 70
Belmont -----	Pea-----	3 18	35,514.85	112,937 23	112,937 23	35,031	111,557 58	111,557 58
Queen Lane -----	Pea-----	3 31	24,630.85	81,528 14	81,528 14	24,366	80,651 46	80,651 46
Shawmont -----	Pea-----	3 17	9,084.20	28,796 94		8,848	28,048 16	
Shawmont -----	Bituminous ---	2 61	19,041.15	49,697 89		20,520	53,557 20	
Shawmont -----	Rice-----	1 92	489.90	940.60	79,435 43	490	940 80	82,546 16
Lardner's Point No. 1.-----	Bituminous ---	2 82	1,938.25	5,453 87		1,534	4,466 88	
Lardner's Point No. 2.-----	Bituminous ---	2 59				19,565	50,673 35	
Lardner's Point No. 2.-----	Bituminous ---	2 44	30,331.18	74,548 27		14,760	36,014 40	
Lardner's Point No. 3.-----	Bituminous ---	2 59	37,659.62	97,009 04	177,106 18	19,939	51,642 01	
Lardner's Point No. 3.-----	Bituminous ---	2 44				15,010	36,697 60	179,491 24
Totals and averages.---	-----	\$2 85	160,095.65	\$155,476 95	\$155,476 95	161,518	\$158,596 14	\$158,596 14

Coal Purchased and Consumed, 1911—Continued.

STATION	Classification	Price per ton	Purchased			Consumed		
			Tons	Oost	Total	Tons	Oost	Total
High Service Stations.								
George's Hill -----	Pea-----	\$3 64	1,217.15	\$4,430 43	-----	1,234	\$4,491 76	-----
George's Hill -----	Pea-----	4 19	400.75	1,679 14	\$8,109 57	400	1,676 00	\$6,167 76
Roxborough -----	Pea-----	3 65	1,812.65	6,616 20	6,616 20	1,998	7,292 70	7,292 70
Mt. Airy -----	Pea-----	3 75	-----	-----	-----	55	206 25	206 25
Wentz Farm -----	Pea-----	3 65	951.95	3,474 62	3,474 62	896	3,270 40	3,270 40
Totals and averages-----	-----	\$3 70	4,382.50	\$16,200 39	\$16,200 39	4,533	\$16,937 11	\$16,937 11
Low Service Stations.								
Roxborough -----	Pea-----	\$3 65	3,050.00	\$11,132 50	\$11,132 50	3,050	\$11,132 50	\$11,132 50
Torresdale -----	Bituminous*---	2 65	4,444.53	11,778 07	-----	4,445	11,779 25	-----
Torresdale -----	Bituminous†---	2 50	23,581.13	71,452 91	83,230 98	26,239	65,587 50	77,376 75
Totals and averages-----	-----	\$2 62	36,075.66	\$94,363 48	\$94,363 48	33,734	\$88,509 25	\$88,509 25

*Oars.

†Boats.

Coal Purchased and Consumed, 1911—Continued.

STATION	Classification	Price per ton	Purchased			Consumed		
			Tons	Cost	Total	Tons	Cost	Total
<i>Filters.</i>								
Upper Roxborough -----	Pea -----	\$3 75	75.45	\$282 94	\$282 94	62	\$232 50	\$232 50
Lower Roxborough -----	Pea -----	3 75	101.75	331 56	381 56	90	337 50	337 50
Torresdale -----	Egg -----	6 40	60.00	384 00	384 00	37	236 80	236 80
Belmont -----	Pea -----	3 64	737.70	2,635 23		725	2,639 00	
Belmont -----	Pea -----	4 19	367.15	1,538 36	4,223 59	367	1,537 73	4,176 73
Queen Lane -----	Pea -----	3 79	34.80	131 89		35	132 63	
Queen Lane -----	Pea -----	4 40	341.90	1,504 36	1,636 25	301	1,324 40	1,457 05
Totals and averages -----		\$4 02	1,718.75	\$6,908 34	\$6,908 34	1,617	\$6,440 58	\$6,440 58
Grand totals -----		\$2 83	202,272.53	\$572,949 16	\$572,949 16	201,452	\$570,483 08	\$570,483 08
Increase -----								
Decrease -----		11	11,819.44	\$55,659 60	\$55,659 60	13,327	\$59,639 87	\$59,639 87

Cost of Pumpage, Gallons Pumped and Percentage of Work Done at Stations, 1911

Pumping stations.	Total expenses.	Total gallons pumped.	Lift in feet, including suction.	Gallons pumped 100 feet high, including suction.	Cost of raising one million gallons 100 feet high.	Percentage of work done.
Fairmount.....	\$6,192 07	31,808,007	92.17	29,311,559	\$213 52	.02
Spring Garden.....	22,489 39					
Belmont.....	231,221 90	*15,993,685,845	315.17	50,403,476,916	4 58	17.62
Queen Lane.....	167,758 92	*15,542,662,500	252.43	39,235,615,625	4 28	13.72
Shawmont.....	190,908 55	*9,895,009,772	393.49	33,935,566,213	4 90	13.62
Lardner's Point No. 1.....	32,238 92	927,589,800	182.40	1,691,134,693	19 07	.59
Lardner's Point No. 2.....	204,467 42	35,473,012,920	193.93	63,790,544,635	2 97	24.06
Lardner's Point No. 3.....	190,139 60	38,212,905,410	227.27	86,846,645,534	2 19	30.37
Totals and averages.....	\$1,015,416 77	116,076,669,254	246.33	285,932,295,175	\$3 65	100.00
High Service Stations.						
George's Hill.....	\$20,049 86	1,065,940,940	135.99	1,449,573,065	\$13 53	88.26
Roxborough.....	32,570 07	1,491,542,060	117.53	1,753,089,237	18 58	46.27

Cost of Pumpage, Gallons Pumped and Percentage of Work Done at Stations, 1911—Continued.

Pumping stations.	Total expenses.	Total gallons pumped.	Lift in feet, including suction.	Gallons pumped 100 feet high, including suction.	Cost of raising one million gallons 100 feet high.	Percentage of work done.
Mt. Airy.....	\$2,612 30					
Wentz Farm.....	15,955 29	416,763,200	140.59	585,944,054	\$27 22	15.47
Totals and averages.....	\$71,187 52	2,974,246,220	127.39	3,788,556,376	\$18 78	100.00
Grand totals.....	\$1,116,604 29	119,050,915,474	243.30	289,720,851,551	\$3 85	
Increase for 1911.....		1,210,497,498		1,814,276,007		
Decrease for 1911.....	\$79,638 79		.96		\$0 31	
Low Service Stations.						
Roxborough.....	\$20,570 07	4,739,440,000	20.53	972,606,738	\$21 14	2.89
Torresdale.....	164,963 09	177,913,508,130	42.00	32,723,673,415	5 04	97.11
Totals and averages.....	\$185,538 16	82,652,948,130	40.77	33,606,370,153	5 65	100.00

*Meters.

†Frankford plus 3,300,000,000 gallons.

Pumpage from rivers, 57.55 of total. Pumpage, high service, 1.47 of total. Pumpage, low service, 40.98 of total.

No. 1—Allis-Chalmers Cross Compound. Ca-
 capacity 6,000,000 Gallons per Day.

GEORGE'S HILL HIGH SERVICE
 STATION, 1911.

Total Capacity 11,000,000 Gallons per Day.

No. 2—Worthington High Service.
 Capacity 5,000,000 Gallons per Day.

1911.	Running time of each engine in hours.		Gallons pumped by each engine.		Total pumpage for each month.	Average pumpage per day.	Coal.		Lubricants.			Mean water pressure per square inch, less mean pressure on suction pipe.		Gallons raised 100 feet high per pound of coal.	
	Months.	No. 1.	No. 2.	No. 1.	No. 2.	Gallons.	Gallons.	Tons.	Pounds.	Pounds.	Quarts.	Quarts.	No. 1.		No. 2.
January	412	331	50,693,040	33,698,320	84,391,360	2,722,302	147				236	156	59	59	348.52
February	272	309	36,448,480	35,963,020	72,411,500	2,586,125	123				196	212	59	59	357.41
March	348	340	46,499,280	34,633,120	81,132,400	2,617,174	127		33		224	112	59	59	387.88
April	322	398	43,893,900	35,555,560	79,449,460	2,645,315	112				192	204	59	59	430.65
May	322	422	49,792,320	39,629,160	89,421,480	2,885,854	111		35		184	124	59	59	489.08
June	309	411	49,110,300	36,800,420	85,910,720	2,863,690	106		5		204	208	59	59	492.04
July	365	378	61,650,720	38,632,200	100,282,920	3,234,932	119		18		188	144	59	59	511.61
August	234	510	37,865,880	56,581,500	94,447,380	3,046,689	120				176	112	59	59	477.82
September	293	427	46,905,480	47,019,260	93,924,740	3,130,824	116		33		176	104	59	59	491.56
October	154	590	24,713,100	72,018,300	96,731,400	3,123,593	119				156	56	59	59	493.49
November	87	633	13,718,160	81,526,940	95,245,100	3,174,836	123		30		156	44	59	59	470.10
December	55	669	8,550,360	84,042,120	92,592,480	2,936,854	132		31		208	40	59	59	425.85
Totals and averages.	3,175	5,528	469,841,020	596,099,920	1,065,940,940	2,920,336	1,634			185	2,296	1,516	59	59	396.06

Total coal increased (179 tons) as per stock account.

Total coal increased (179 tons) as per stock account.

THE NEW YORK
PUBLIC LIBRARY
ASTOR, LENOX AND
TILDEN FOUNDATIONS

No. 2—Worthington High Duty Duplex
Capacity 5,000,000 Gallons per Day.

ROXBOROUGH TITANIUM PIPES CO.
STATION, 1911.

THE NEW YORK
PUBLIC LIBRARY
ASTOR, LENOX AND
TILDEN FOUNDATION

No. 1—Worthington Duplex. Capacity
5,000,000 Gallons per Day.

ROXBOROUGH HIGH SERVICE STATION, 1911.

Total Capacity 10,000,000 Gallons per Day.

No. 2—Worthington High Duty Duplex.
Capacity 5,000,000 Gallons per Day.

1911.	Running time of each engine in hours.		Gallons pumped by each engine.		Total pumpage for each month.	Average pumpage per day.	Coal.		Lubricants.			Mean water pressure per square inch, less mean pressure on suction pipe.		Gallons raised 100 feet high per pound of coal.
									Grease and tallow.	Cylinder oil.	Engine oil.			
Months.	No. 1.	No. 2.	No. 1.	No. 2.	Gallons.	Gallons.	Tons.	Pounds.	Pounds.	Quarts.	Quarts.	No. 1.	No. 2.	
January-----	123	618	26,848,800	94,370,840	121,219,640	3,910,310	204	-----	35	92	24	51	51	311.78
February-----	9	663	2,264,400	100,747,900	103,012,300	3,679,010	142	-----	21	84	20	51	51	380.63
March-----	208	535	44,445,600	82,061,600	126,507,200	4,080,877	167	-----	18	156	24	51	51	397.47
April-----	34	638	7,952,400	105,041,260	112,993,660	3,766,455	134	-----	22	162	24	51	51	442.44
May-----	185	559	46,512,000	96,516,180	143,028,180	4,613,812	181	-----	18	156	24	51	51	414.62
June-----		720		115,789,400	115,789,400	3,859,646	133	-----	22	212	24	51	51	456.79
July-----	3	740	950,400	134,383,240	135,333,640	4,365,601	156	-----	23	216	24	51	51	455.18
August-----	2	742	540,000	130,191,720	130,731,720	4,217,152	151	-----	23	156	24	51	51	454.26
September-----	3	716	672,000	123,568,100	124,540,100	4,151,336	144	-----	28	148	24	51	51	457.78
October-----	12	732	2,894,400	127,949,900	130,844,300	4,220,783	152	-----	31	164	24	51	51	451.66
November-----	77	639	19,044,000	106,538,140	125,582,140	4,186,071	152	-----	30	136	24	51	51	433.04
December-----	36	709	8,341,200	113,618,600	121,959,800	3,934,187	145	-----	31	140	24	51	51	441.32
Totals and averages	692	8,061	160,765,200	1,330,776,880	1,491,542,080	4,066,416	1,998	-----	302	1,812	284	61	51	391.74

Total coal increased (37 tons) as per stock account.

No. 1—Holly Rotary Duplex. Capacity
3,000,000 Gallons per Day.

WENTZ FARM HIGH SERVICE STATION, 1911.

No. 2—D'Auria Horizontal Compound. Ca-
pacity 4,000,000 Gallons per Day.

Total Capacity 7,000,000 Gallons per Day.

1911.	Running time of each engine in hours.		Gallons pumped by each engine.		Total pumpage for each month.	Average pumpage per day.	Coal.		Lubricants.			Mean water pressure per square inch, less mean pressure on suction pipe.		Gallons raised 100 feet high per pound of coal.
									Grease and tallow.	Cylinder oil.	Engine oil.			
Months.	No. 1.	No. 2.	No. 1.	No. 2.	Gallons.	Gallons.	Tons.	Pounds.	Pounds.	Quarts.	Quarts.	No. 1.	No. 2.	
January	545	198	19,498,320	11,408,280	30,906,600	996,987	78			100	120	61	61	245.69
February	416	225	15,188,960	12,472,200	27,661,160	987,893	72		6	100	88	61	61	241.13
March	506	238	17,817,410	13,294,160	31,111,570	1,003,599	69			120	104	61	61	283.00
April	393	321	12,770,550	18,127,200	30,897,750	1,029,925	64			116	84	61	61	308.01
May	448	296	18,769,670	19,902,870	38,672,540	1,021,694	69			140	92	61	61	351.78
June	387	333	14,583,030	22,474,140	37,057,170	1,235,239	66			132	84	61	61	352.33
July	293	355	18,148,400	25,326,600	43,475,000	1,402,432	75			164	112	61	61	363.82
August	623	117	28,346,550	7,808,580	36,155,130	1,169,520	66			100	96	61	61	343.82
September	719		33,894,320		33,894,320	1,129,810	60			100	96	61	61	354.56
October	392	352	13,734,610	23,536,110	37,270,720	1,202,216	76			120	76	61	61	307.80
November	384	336	13,693,900	20,271,030	33,964,930	1,132,164	73			126	88	61	61	292.03
December	408	336	14,381,250	21,315,060	35,696,310	1,151,493	81		1	140	92	61	61	276.60
Totals and averages	5,649	3,107	220,826,970	195,936,230	416,763,200	1,141,817	896		7	1,468	1,132	61	61	291.95

Total coal increased (47 tons) as per stock account.

81
7
5
4
17
6
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6

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ASTOR, LENOX AND
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APPENDIX C

REPORT

OF THE

ASSISTANT IN CHARGE OF DISTRIBUTION

Philadelphia, January 1, 1912.

MR. FRED. C. DUNLAP,
Chief, Bureau of Water.

SIR:—I have the honor to submit the following report on the distribution system for the year 1911:

Mains.

The following is a statement of the mains laid, relaid, taken up, etc.:

New Work.

	Feet.
Service mains laid.....	136,286
Connections, etc.	5,830
Total	142,116

*Comparison of Conditions Relative to the Distribution,
1910-1911.*

	1910	1911	Increase	Decrease
Service mains, 4 inches to 16 inches.....	125,819	136,286	10,467	-----
Supply mains	3,983	-----	-----	3,983
Connections and miscellaneous work.....	7,435	5,830	-----	1,605
Totals in feet.....	137,242	142,116	10,467	5,593

Of the 136,286 feet of service mains laid, 129,300 feet were laid by the City, for which \$1.00 per foot was charged against each property owner fronting thereon, and 6,986 feet were laid by private contract under ordinance of Councils, approved April 12, 1909, which requires no payment to the City by those paying their pro rata share of the cost of laying the pipe, but against those not joining in the expense of laying the pipe the usual charge of \$1.00 per foot front is made.

	1910.	1911.	Increase.	Decrease.
Relaid, 3 inches to 30 inches.....	4,630	5,805	1,175	
Miscellaneous repairs, 3 inches to 48 inches	4,592	6,018	1,426	
Taken up, 3 inches to 48 inches.....	3,221	3,081		190
Lowered, raised and shifted, 4 inches to 48 inches.....	2,908	3,578	670	
Totals, in feet.....	15,351	18,432	3,271	190
Pipe cut off and abandoned.....	4,287	4,291	4	

Repairs.

	Feet.
Mains relaid	5,805
Repairs and connections.....	6,018
	11,823
Old pipe taken up	3,031
Pipe lowered, raised and shifted.....	3,578
	6,609
Total	18,432

Abandoned.

	Feet.
Three inch	7
Four inch	398
Six inch	3,734
Ten inch	92
Thirty inch	60
Total	4,291

The total quantity of pipe handled for all purposes throughout the year was 160,548 feet, weighing 7,365,846 pounds.

The number of feet of new pipe added during 1911 was 140,599, or 26.63 miles, making in addition to that in use January 1, 1911, 1,664.23 miles, plus pipe laid by contract for the improvement, extension and filtration of the water supply, and not previously reported, of 213,891 feet, or 40.51 miles, equal to 9,001,004 feet, or 1,704.74 miles now in use.

Fire Hydrants.

New fire hydrants in new locations.....	322
New fire hydrants in place of old fire hydrants	335
Total	657
New style fire hydrants taken out.....	41
Old style fire hydrants taken out
Total	41

The total number of new style fire hydrants added to the distribution system was 281, and the total number in use December 31, 1911, was 16,569, of which 358 are of the old style, and 16,211, or 97.8 per cent., of the new pattern. Of this latter number 694 are installed on the High Pressure Fire Service System.

Drills for Attachments.

	No. of openings.	Area, sq. ins.
One-half inch	7,297	1,433
Five-eighths inch	481	148
Three-quarter inch	168	74
One inch	105	82
One and one-quarter inch.....	22	27
One and one-half inch.....	49	87
Two inches	71	223
Three inches	10	71
Four inches	13	163
Six inches	14	396
Totals	8,230	2,704

Tabulation of work performed and of expenditures made are also submitted herewith, together with various other tables, compiled as in previous years.

The report of the pipe inspector relative to the inspection of pipe and other castings during the year, in tabulated form, also accompanies this report.

In closing I desire to give full credit to the assistance rendered this Bureau by Dr. William C. Robinson, Chemist, Bureau of Health. From time to time during the year Dr. Robinson made chemical analyses of samples of water submitted to him, thus enabling us to determine the source of leaks reported to the Bureau of Water by various property owners throughout the City.

Respectfully submitted,

W. WHITBY,

Assistant in Charge of Distribution.

SERVICE AND SUPPLY MAINS LAID DURING 1911.

FIRST DISTRICT.

Comprising the 1st, 2d, 3d, 4th, 26th, 30th, 36th, and 39th Wards.

Purposes for which used.		Size in inches.						Total in feet and pounds.	
		3	4	6	8	10	12		20
New pipe or feet added.	Service mains.....			5,775	4,014	1,432	9,612	20,833	
	Service main connections.....				48	10		68	
	Fire hydrant connections.....			751				751	
	Fire connections (private).....		10				10	20	
	Supply connections (private).....	40		20				60	
Total.....		40	10	6,546	4,062	1,442	9,622	21,722	
		600	200	216,018	170,604	79,310	721,650	1,188,382	
Pipe used, but adding nothing to feet in ground.	Pipe rclaid.....			19	66	130	147	362	
	Repairs, general.....			68	4	5		82	
	Pipe taken up.....		8	287			12	307	
	Total.....		8	374	70	135	159	5	751
			160	12,342	2,940	7,425	11,925	775	35,567
Total handled.....		40	18	6,920	4,132	1,577	9,781	22,473	
		630	360	228,360	173,544	86,735	733,575	1,223,949	
Pipe cut off and abandoned.....				97				97	

SECOND DISTRICT.

Comprising the 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 16th and 17th Wards.

Purposes for which used.		Size in inches.							Total in feet and pounds.	
		3	4	6	8	10	12	16		20
New pipe or feet added.	Service mains.....			31						31
	Supply main connections.....					17				17
	Fire hydrant connections.....			153						153
	Fire connections (private).....			64						64
	Supply connections (private).....	27	90	224						341
	Drains.....		3							3
Total.....		27	93	472		17				609
		405	1,860	15,576		935				18,776
Pipe used, but adding nothing to feet in ground.	Pipe relaid.....			420	1,092	1,313				2,825
	Repairs, general.....		4	97		16	9	5	11	142
	Pipe taken up.....			769		442				1,211
	Pipe raised.....					312				312
	Total.....		4	1,286	1,092	2,083	9	5	11	4,400
		80	42,438	45,864	114,565	675	575	1,705	205,902	
Total handled.....		27	97	1,758	1,092	2,100	9	5	11	5,099
		405	1,940	58,014	45,864	115,500	675	575	1,705	224,678
Pipe cut off and abandoned.....		7	257	1,838		84				2,186

THIRD DISTRICT.

Comprising the 18th, 19th, 23d, 25th, 31st, 33d, 35th, 41st and 45th, and part of the 37th, 42d and 43d Wards.

Purposes for which used.		Size in inches.										Total in feet and pounds.
		3	4	6	8	10	12	16	20	30	48	
New pipe or feet added.	Service mains.....			17,615	8,953	77	619					27,264
	Service main connections.....			10								10
	Fire hydrant connections.....			862								862
	Fire connections (private).....		79	56								135
	Supply connections (private).....	67	34	15								116
	Drains.....			36								36
Total.....		67	113	18,594	8,953	77	619					28,423
		1,005	2,260	613,602	376,026	4,235	46,425					1,043,553
Pipe used, but adding nothing to feet in ground.	Pipe relaid.....			126			25					151
	Repairs, general.....	4	24	817	4	10	29	12	13	27	22	962
	Pipe taken up.....		66	80	28							174
	Pipe lowered.....			1,010						571	500	2,081
	Total.....	4	90	2,033	32	10	54	12	13	598	522	3,363
	60	1,800	67,089	1,344	550	4,060	1,330	2,015	197,340	339,300	614,928	
Total handled.....		71	203	20,627	8,985	87	673	12	13	598	522	31,791
		1,065	4,060	630,691	377,370	4,785	50,475	1,330	2,015	197,340	339,300	1,658,481
Pipe cut off and abandoned.....			64	206								270

FOURTH DISTRICT.

Comprising the 15th, 20th, 28th, 29th, 32d, 47th and part of the 37th and 38th Wards.

Purposes for which used.		Size in inches.						Total in feet and pounds.
		3	4	6	8	10	12	
New pipe or feet added.	Service mains.....			7,102	3,208	397	2,023	12,730
	Service main connections.....				16			16
	Supply main connections.....				11			21
	By-pass connections.....							30
	Fire hydrant connections.....							382
	Fire connections (private).....							55
	Supply connections (private).....	18	22					40
	Drains.....			8				8
Total.....		18	22	7,587	3,235	397	2,023	13,282
		270	440	250,371	135,870	21,835	151,725	560,511
Pipe used, but ad- ding nothing to feet in ground.	Pipe relaid.....			961	218		30	1,269
	Repairs, general.....		11	1,176	35	7	745	1,974
	Pipe taken up.....			862				862
	Pipe lowered.....			65				65
	Pipe raised.....			50			155	205
	Total.....			11	3,114	253	7	775
			220	102,762	10,626	385	53,125	243,063
Total handled.....		18	33	10,701	3,488	404	2,798	17,657
		270	660	353,133	146,496	22,220	209,850	803,579
Pipe cut off and abandoned.....				341		8	60	409

FIFTH DISTRICT.

Comprising the 21st and part of the 38th Wards.

Purposes for which used.		Size in inches.						Total in feet and pounds.		
		6	8	10	12	30	36		48	
New pipe or feet added.	Service mains.....	2,652	4,275	362					7,289	
	Supply main connections.....	10							10	
	Fire hydrant connections.....	202							202	
	Fire connections (private).....	34							34	
	Drains.....	19							19	
	Total.....	{ Feet { Pounds.....	2,917 96,561	4,275 179,550	362 19,910					7,554 295,721
Pipe used, but adding nothing to feet in ground.	Repairs, general.....	34	5	15	10	66	50	74	254	
	Pipe taken up.....	12							12	
	Pipe lowered.....	200							200	
	Total.....	{ Feet { Pounds.....	246 8,118	5 210	15 925	10 750	66 21,780	50 21,000	74 48,100	466 100,783
Total handled.....		{ Feet { Pounds.....	3,163 104,379	4,280 179,769	377 20,735	10 750	66 21,780	50 21,000	74 48,100	8,020 396,504
Pipe cut off and abandoned.....										

SIXTH DISTRICT.

Comprising the 22d and part of the 37th, 38th, 42d and 43d Wards.

Purposes for which used.		Size in inches.						Total in feet and pounds.
		3	4	6	8	10	12	
New pipe or feet added.	Service mains.....		505	13,728	11,567	785	1,351	27,980
	Supply main connections.....				6			6
	Fire hydrant connections.....			759				759
	Fire connections (private).....			15				15
	Supply connections (private).....		15	14				29
	Drains.....			4				4
Total.....		}	520	14,520	11,573	785	1,351	28,749
		}	10,400	479,160	486,066	43,175	101,325	1,120,126
Pipe used, but adding nothing to feet in ground.	Pipe relaid.....			197	12		762	971
	Repairs, general.....	3	25	2,048	9	13	37	40
	Pipe taken up.....	26	41	210				277
	Pipe lowered.....			636			79	715
	Total.....		}	29	66	3,091	21	13
		}	435	1,320	102,003	882	715	65,850
Total handled.....		}	29	586	17,611	11,594	2,229	40
		}	435	11,720	581,163	486,948	43,890	167,175
Total handled.....				77	1,187			1,244
Pipe cut off and abandoned.....								

SEVENTH DISTRICT.

Comprising the 24th, 27th, 34th, 40th, 44th and 46th Wards.

Purposes for which used.		Size in inches.						Total in feet and pounds.	
		3	4	6	8	10	12		16
New pipe or feet added.	Service mains.....			21,286	14,230	1,429	2,208	1,050	40,208
	Fire hydrant connections.....			1,403					1,403
	Fire connections (private).....			35					35
	Supply connections (private).....	18	98						116
	Motor connections (private).....	20							20
	Total.....	{Feet.....	38	98	22,724	14,230	1,429	2,208	1,050
	{Pounds.....	570	1,960	749,892	597,660	78,595	165,600	120,750	1,715,027
Pipe used, but adding noth- ing to feet in ground.	Pipe relaid.....			167				60	227
	Repairs, general.....		3	154	144	9	117	2	429
	Pipe taken up.....		16	172					188
	Total.....	{Feet.....		19	493	144	9	117	62
	{Pounds.....		380	16,269	6,048	495	8,775	7,130	39,097
Total handled.....	{Feet.....	38	117	23,217	14,374	1,438	2,325	1,112	42,621
	{Pounds.....	570	2,340	766,161	608,708	79,090	174,375	127,880	1,754,124
Pipe cut off and abandoned.....				85					85

Recapitulation of Work on Water Pipes.

Purposes for which used.	Size in inches.										Total in feet and pounds.		
	3	4	6	8	10	12	16	20	30	36		48	
Pipe new or feet added.	Service mains.....		505	68,189	46,247	4,482	15,813	1,050				136,286	
	Service main connections.....			10	64	10						84	
	Supply main connections.....				20	17						54	
	Bye-pass connections.....											30	
	Fire hydrant connections.....			4,512								4,512	
	Fire connections (private).....		89	259			10					358	
	Supply connections (private).....	170	259	273								702	
	Motor connections (private).....	20										20	
	Drains.....		3	67								70	
	Total.....	190 2,850	856 17,120	73,360 2,420,880	46,328 1,945,776	4,509 247,995	15,823 1,186,725	1,050 120,750				142,116 5,942,006	
Pipe used, but adding nothing to feet in ground.	Pipe relaid.....			1,890	1,388	1,443	964	60		60		5,805	
	Repairs, general.....	7	67	4,394	201	75	947	19	29	133	50	6,018	
	Pipe taken up.....	26	131	2,392	28	442	12					3,081	
	Pipe lowered.....			1,911			79				571	3,061	
	Pipe raised.....			50		312				155		517	
		Total.....	33 495	198 3,960	10,637 251,021	1,617 67,914	2,272 124,960	2,002 150,150	79 9,065	29 4,495	919 303,270	50 21,000	596 387,400
	Total handled.....	223 3,345	1,054 21,080	83,997 2,771,901	47,945 2,013,690	6,781 372,955	17,825 1,336,875	1,129 129,835	29 4,495	919 303,270	50 21,000	596 387,400	160,548 7,365,846
Pipe cut off and abandoned.....	7	398	3,734		92					60		4,291	

Recapitulation by Districts.

Districts.	Size in inches.											Feet.	Pounds.	
	3	4	6	8	10	12	16	20	30	36	48			
New pipe or feet added.	First	40	10	6,546	4,062	1,442	9,622						21,722	1,188,382
	Second	27	93	472		17							609	18,776
	Third	67	113	18,594	8,953		77	619					28,423	1,043,553
	Fourth	18	22	7,587	3,235	397	2,023						13,282	560,511
	Fifth			2,917	4,275	362							7,554	295,721
	Sixth		520	14,520	11,573		785	1,351					28,749	1,120,126
	Seventh	38	98	22,724	14,230	1,429	2,208	1,050					41,777	1,715,027
	Total.....	190	856	73,360	46,328	4,509	15,923	1,050					142,116	
	2,850	17,120	2,420,880	1,945,776	247,995	1,186,725	120,750						5,942,096	
Pipe used, but adding nothing to feet in ground.	First		8	374	70	135	159			5			751	85,567
	Second		4	1,286	1,092	2,083	9	5	11				4,490	205,902
	Third	4	90	2,033	3 ²	10	54	12	13			522	3,368	614,928
	Fourth		11	3,114	253	7	775			215			4,375	243,068
	Fifth			246	5	15	10			66	50	74	466	100,783
	Sixth	29	66	3,091	21	13	878				40		4,138	184,405
	Seventh		19	493	144	9	117	62					844	39,097
	Total.....	33	198	10,637	1,617	2,272	2,002	79	29	919	50	596	18,432	
	49 ¹	3,900	351,021	67,914	124,960	150,150	9,085	4,495	303,270	21,000	387,400	1,423,750		
Total handled.....	223	1,054	83,997	47,945	6,781	17,925	1,129	29	919	50	596	160,548		
	3,345	21,080	2,771,901	2,013,690	372,955	1,336,875	129,835	4,495	303,270	21,000	387,400	7,365,846		
Pipe cut off and abandoned.....	7	398	3,734		92				60			4,291		

Total Feet of Pipe in Use December 31, 1911.

Size in inches.	Total in use December 31, 1910.	Extension and relays during 1911.			Deductions during 1911.			Total in use December 31, 1911.
		Laid.	Relaid.	Total.	Taken up.	Abandoned.	Total.	
1	175							175
1½	3,566							3,566
2	3,655							3,655
3	77,379	190		190	26	7	33	77,536
4	160,007	856		856	131	398	529	160,334
6	5,821,558	73,360	1,890	75,250	2,392	3,734	6,126	5,890,682
8	412,108	46,328	1,388	47,716	28		28	459,796
10	541,605	4,509	1,443	5,952	442	92	534	547,023
12	540,413	15,823	964	16,787	12		12	557,188
16	197,947	1,050	60	1,110				199,057
18	16,044							16,044
20	281,806							281,806
22	1,084							1,084
23	27							27
24	20,613							20,613
30	298,380		60	60		60	60	298,380
36	102,068							102,068
48	210,245							210,245
60	9,500							9,500
Total	8,698,179	142,116	5,805	147,921	3,031	4,291	7,322	8,838,778
Extension and improvement of distribution and filtration not previously reported								162,226
Total pipe in use December 31, 1911								9,001,004

Recapitulation of Fire Hydrants Set, Renewed and Removed.

Districts.		Style.		Total.
		No. 1.	No. 2.	
Set.	First	41	4	45
	Second	14	1	15
	Third	59	5	64
	Fourth	31		31
	Fifth	12		12
	Sixth	67	2	69
	Seventh	83	3	86
	Total	307	15	322
Renewed.	First	3		3
	Second	81	15	96
	Third	56	18	74
	Fourth	41	6	47
	Fifth	5		5
	Sixth	43		43
	Seventh	55	12	67
	Total	284	51	335
Total new fire hydrants.....				667
Removed.	First	3		3
	Second	10	2	12
	Third	11	1	12
	Fourth	2	1	3
	Fifth	1		1
	Sixth	3	1	4
	Seventh	3	3	6
	Total	33	8	41
Total added during 1911.....				281

Fire Hydrants by Wards.

Wards.	Style.							Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	High pressure.	
First	1	202	67	8				278
Second	1	134	90	15				240
Third.....	3	82	44	6				135
Fourth.....	1	67	37	14				119
Fifth.....	15	116	55	3			29	218
Sixth.....	8	104	37	5			79	233
Seventh.....	5	160	73	4				242
Eighth.....	9	145	80	3		1	85	273
Ninth.....		154	59	2		1	60	276
Tenth.....		121	57			4	43	225
Eleventh.....	4	80	21	1			5	111
Twelfth.....	7	76	17	2				102
Thirteenth.....	23	93	46	5				167
Fourteenth.....		107	72				21	200
Fifteenth.....		241	205	4	1	2	13	466
Sixteenth.....	2	92	30	3	1		21	149
Seventeenth.....	11	98	20	1			33	163
Eighteenth.....	11	216	59	9				295
Nineteenth.....	31	347	113	7			189	667
Twentieth.....	16	153	124	1			27	321
Twenty-first.....	35	447	36	7				525
Twenty-second.....	51	1,306	143	18				1,518
Twenty-third.....	37	399	82	6				524
Twenty-fourth.....	16	350	147	8				521
Twenty-fifth.....		304	62	2			8	376
Twenty-sixth.....		248	125	14				387
Twenty-seventh.....	3	199	64	6		1		273
Twenty-eighth.....		178	132	27				337
Twenty-ninth.....		118	107	4		1		230
Thirtieth.....	5	130	110	6				251
Thirty-first.....		259	66	6			1	332

Fire Hydrants by Wards—Continued.

Wards.	Style.							Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	High pressure.	
Thirty-second ----	5	139	96	7	-----	1	13	261
Thirty-third -----	15	501	119	9	1 -----	-----	69	714
Thirty-fourth ----	6	472	36	4	-----	1	-----	519
Thirty-fifth -----	-----	194	24	5	-----	-----	-----	223
Thirty-sixth -----	3	395	104	23	-----	-----	-----	530
Thirty-seventh ---	2	117	74	4	-----	-----	22	219
Thirty-eighth ----	8	560	110	10	-----	-----	-----	688
Thirty-ninth -----	-----	269	90	7	-----	-----	-----	366
Fortieth -----	7	390	60	2	-----	-----	-----	459
Forty-first -----	-----	63	9	10	-----	-----	-----	82
Forty-second -----	-----	366	15	9	-----	-----	-----	390
Forty-third -----	7	380	54	6	-----	-----	15	462
Forty-fourth -----	6	249	63	8	-----	-----	-----	326
Forty-fifth -----	-----	352	72	4	-----	-----	7	435
Forty-sixth -----	-----	416	66	15	-----	-----	-----	497
Forty-seventh ----	4	111	104	1	-----	-----	4	224
Totals -----	358	11,700	3,476	326	3	12	694	16,569

Fire Hydrants by Purveyor's Districts.

Districts.	Style.							Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	High pressure.	
First	11	1,537	698	101				2,347
Second	77	1,367	563	32	1	6	326	2,362
Third	103	2,918	628	62	1		289	4,001
Fourth	27	1,209	900	42	1	4	79	2,262
Fifth	37	678	36	8				659
Sixth	65	2,025	215	38				2,343
Seventh	38	2,076	436	43		2		2,595
Totals	358	11,700	3,476	326	3	12	694	16,599

THE NEW YORK
PUBLIC LIBRARY
ASTOR, LENOX AND
TILDEN FOUNDATIONS.

THE
PUBLIC LIBRARY
ASTOR, LENOX AND
TILDEN FOUNDATIONS.

Attachments, Etc., Made by the Purveyors in accordance with Permits Issued by the Bureau of Water.

Districts.	New attachments.										Shut off by permit.						Work done without permit.						
	Size.										Reamed for larger attachments.	Redriven.	Discontinued.	Transfer.	Repairs.		Total.	Drawn.				Drawn and redriven.	
	½-inch.	¾-inch.	1-inch.	1¼-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.					Not drawn.	Drawn and re-driven.		Discontinued and abandoned.	Delinquent.	Leak.	Total.		
First -----	1,199	70	25	13	2	11	7	2	1	---	1,330	19	273	17	---	---	43	351	21	22	294	337	---
Second -----	114	37	44	25	10	6	13	---	---	---	249	45	91	103	---	---	150	389	16	2	190	208	---
Third -----	1,417	54	17	19	2	17	21	5	6	8	1,566	---	17	90	11	---	246	364	115	16	324	455	43
Fourth -----	776	4	6	9	4	6	13	1	1	2	822	47	170	---	---	---	73	290	28	---	3	31	---
Fifth -----	248	46	2	1	---	1	3	---	---	---	301	6	1	3	1	11	16	38	1	---	2	3	---
Sixth -----	1,189	97	44	13	1	2	5	---	1	3	1,355	41	78	90	---	21	---	230	---	3	77	80	---
Seventh -----	2,354	173	30	25	3	6	9	2	4	1	2,607	32	33	37	1	---	69	172	10	9	78	97	---
Totals -----	7,297	481	168	105	22	49	71	10	13	14	8,230	189	663	340	13	32	597	1,834	191	52	968	1,211	43

*Repairs to Mains, Stops and Fire Hydrants, also Stops
and Fire Hydrants Removed during 1911.*

Districts.	Repairs to mains.	Stops.			Fire hydrants.		
		Repaired.	Renewed.	Removed.	Repaired.	Renewed.	Removed.
First	44	146		22	1,028	8	8
Second	188	171	7	19	646	90	12
Third	29	320	12	10	121	74	12
Fourth	116	592	7	5	380	47	8
Fifth	70	36		2	12	5	1
Sixth	53	22	3	11	18	43	4
Seventh	61	348	10	11	203	67	6
Totals	561	1,635	39	80	2,408	335	41

Total Number Valves and Check Valves, Arranged by Districts.

Pattern.	Size.	Outlets.	Districts.							Totals.
			1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	
Single Gate Bureau of Water	3"	2-way	5	186	4	26	2	18	13	254
	4"	2-way	114	257	71	164	52	87	94	839
	6"	2-way	4,096	2,625	5,267	3,449	835	3,114	4,093	23,479
	8"	2-way	215	141	307	139	32	147	452	1,433
	10"	2-way	272	457	375	248	40	233	282	1,907
	12"	2-way	173	232	366	182	51	297	226	1,527
	16"	2-way	38	50	71	21	5	49	41	275
	18"	2-way	-----	-----	7	18	-----	1	-----	26
	20"	2-way	25	41	20	37	14	17	33	187
	30"	2-way	8	10	32	27	19	3	3	102
	36"	2-way	3	2	8	12	11	-----	8	44
	48"	2-way	-----	-----	3	9	-----	-----	-----	12
Totals..			4,949	4,001	8,531	4,332	1,061	3,966	5,245	30,065
Butterfly Bureau of Water	20"	2-way	-----	1	5	8	4	4	5	27
	20"	2-way	2	2	7	7	9	3	4	34
	36"	2-way	-----	-----	5	17	2	-----	-----	24
	48"	2-way	-----	2	7	31	22	-----	1	63
	Totals..			2	5	24	63	37	7	10
Barton	6"	4-way	3	3	-----	12	-----	-----	12	30
	8"	4-way	-----	-----	-----	5	-----	-----	-----	5
	6"	5-way	12	21	-----	-----	-----	-----	-----	33
	6"	6-way	-----	1	-----	-----	-----	-----	1	2
	Totals..			15	25	-----	17	-----	-----	13

Total Number Valves and Check Valves.—Continued.

Pattern.	Size.	Outlets.	Districts.							Totals.
			1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	
Viney	6"	2-way	3		5	3				11
	6"	3-way	44	51	19	222	4	8	3	351
	8"	3-way							4	4
	10"	3-way				3				3
	12"	3-way		1		3			1	5
	6"	4-way	22	21	18	90	4	7	7	169
	9"	4-way	1		1				4	6
	10"	4-way				11				11
	12"	4-way						1		1
	6"	5-way	24	5	1	26			2	58
	Totals..		94	78	44	358	8	16	21	619
Smith Patent	3"	2-way	3	57	4	13			11	88
	4"	2-way	5	60	3	15			7	90
	6"	2-way	4	105	34	47	15	24	27	256
	8"	2-way	1	1	14	2	2	4		24
	10"	2-way		7	12	2	3	11	7	42
	12"	2-way	1	11	10				4	26
	16"	2-way	4	2	4			5		15
	20"	2-way		1	2				6	9
	Totals..		18	244	83	79	20	44	62	550
Ludlow	3"	2-way			20	1		2	24	47
	4"	2-way				1				1
	6"	2-way					5		18	21
		Totals..			20	2	5	2	40	69

Total Number of Valves and Check Valves—Continued.

Pattern.	Size.	Outlets.	Districts.							Totals.
			1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	
Eddy	6"	2-way		11	1	10	33	10	15	80
	8"	2-way			1		1	5		7
	10"	2-way		8		1	8	12	21	50
	12"	2-way		5	1		2	2	4	14
	16"	2-way		2	1		2	15	15	35
	20"	2-way	1	5		1	2	17	9	35
	24"	2-way					4	5		9
	30"	2-way		3	5	1	14	4	3	30
	36"	2-way		3	8	2	4		8	25
	48"	2-way				18				18
	Totals..		1	37	35	15	70	70	75	303
Eddy Rotary	20"	2-way			2					2
	30"	2-way				2		1		3
	Totals..				2	2		1		5
Rensaeler	8"	2-way			4	16		13		33
	12"	2-way				3			1	4
	16"	2-way			2	4				6
	20"	2-way				2		2		4
	24"	2-way						2		2
	30"	2-way				1				1
	Totals..				6	26		17	1	50
Rensaeler Rotary	30"	2-way			1					1
Pratt & Cady	16"	2-way	1							1
	20"	2-way	1	1	1					3
	30"	2-way		1	1					2
	36"	2-way	1		6	1				8
	Totals..		3	2	8	1				14

Total Number of Valves and Check Valves—Continued.

Pattern.	Size.	Outlets.	Districts.							Totals.
			1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	
Van Winkle	3"	2-way		4						4
Water Works Equipment Co.	20"	2-way	1							1
Chapman	3"	2-way			3					3
Electric, Kennedy	20"	2-way			1					1
High pressure valves.	Williams- port	8"	2-way		190					190
		12"	2-way		54					54
		16"	2-way		19					19
		Totals..		263						263
	Chapman	8"	2-way		12					12
		12"	2-way		3					3
		16"	2-way		3					3
		Totals..		18						18
	Smith	8"	2-way		154					154
		12"	2-way		9					9
		16"	2-way		1					1
		Totals..		164						164
	Ludlow	20"	2-way		4					4
Total number of valves.....			5,083	4,845	6,758	4,895	1,201	4,123	5,467	32,372
Check valves, Bureau of Water	12"			1						1
	20"						1		3	4
	30"				1		5		3	9
	36"				1		4		2	7
	48"				4	4	6			14
	Totals..			1	6	4	16		8	35

Number of Complaints and Examinations During 1910 and 1911.

Months.	Hydrants.		Service pipes.		Wash paves.		Spigots.		Water closets.		Horse troughs.		No leaks.		Totals.	
	1910	1911	1910	1911	1910	1911	1910	1911	1910	1911	1910	1911	1910	1911	1910	1911
January.....	133	124	236	186	1	8	50	12	75	75	2	7	3	9	500	421
February.....	168	83	210	107	7	-----	75	17	120	58	-----	1	1	10	581	276
March.....	185	95	224	95	3	2	51	41	60	69	-----	-----	2	2	525	304
April.....	146	68	156	62	5	3	27	33	50	48	1	3	4	5	389	222
May.....	177	98	180	89	10	2	80	30	100	71	1	5	11	8	559	303
June.....	200	118	185	115	3	5	70	23	111	69	2	1	4	3	575	334
July.....	210	121	165	104	7	2	100	30	119	42	4	4	-----	13	605	316
August.....	200	128	211	98	5	4	67	36	80	81	2	1	5	14	570	362
September.....	200	128	175	81	9	-----	100	49	70	82	4	4	7	11	565	365
October.....	250	131	201	102	12	2	70	30	90	86	8	1	1	5	632	357
November.....	225	79	215	115	7	7	60	27	141	58	3	1	3	14	654	301
December.....	190	76	175	100	4	8	35	26	113	37	5	4	8	10	530	261
Totals.....	2,284	1,249	2,333	1,254	73	43	785	354	1,129	776	32	32	49	104	6,685	3,812

Schedule of Pipes and Castings Inspected During 1911.

	Manufacturer.	Size in inches.		Inspected.	Rejected.	Accepted.
		Pipe.	Special castings.			
Bureau of Water.	Standard Pipe and Foundry Company.....	6 in.....	-----	4,547	460	4,087
	Standard Pipe and Foundry Company.....	8 in.....	-----	2,392	380	2,012
	Standard Pipe and Foundry Company.....	10 in.....	-----	1,172	146	1,026
	Standard Pipe and Foundry Company.....	12 in.....	-----	659	9	650
	Donaldson Iron Company.....	6 in.....	-----	2,828	675	2,153
	Donaldson Iron Company.....	8 in.....	-----	588	93	495
	Donaldson Iron Company.....		Small specials	4,936	858	4,078
	J. Alfred Clark.....		Frames and covers.....	1,046	85	961
	J. Alfred Clark.....		Grate bars	973	99	874
	J. Alfred Clark.....		Extra covers	107	7	100
J. Alfred Clark.....		Floor gratings.....	38	4	34	
	Totals.....			19,286	2,816	16,470

Schedule of Pipes and Castings Inspected During 1911—Continued.

	Manufacturer.	Size in inches.		Inspected.	Rejected.	Accepted.
		Pipe.	Special castings.			
Bureau of Surveys.	Donaldson Iron Company.....	4 in..	-----	369	191	169
	Donaldson Iron Company.....	6 in..	-----	18	3	15
	Donaldson Iron Company.....	-----	Small specials	109	18	91
	United States Cast Iron Pipe and Foundry Company	4 in..	-----	4	-----	4
	United States Cast Iron Pipe and Foundry Company	6 in..	-----	207	12	195
	United States Cast Iron Pipe and Foundry Company	8 in..	-----	98	2	96
	United States Cast Iron Pipe and Foundry Company	10 in..	-----	15	2	13
	United States Cast Iron Pipe and Foundry Company	12 in..	-----	14	1	13
	United States Cast Iron Pipe and Foundry Company	30 in..	-----	6	1	5
	United States Cast Iron Pipe and Foundry Company	-----	Small specials	120	26	94
	Camden Iron Works.....	-----	Small specials	29	8	21
	Camden Iron Works.....	-----	Flange specials	13	5	8
	Camden Iron Works.....	12 in..	-----	3	1	2
	Camden Iron Works.....	20 in..	-----	1	-----	1
	Camden Iron Works.....	18 in..	-----	2	-----	2
Camden Iron Works.....	*12 in..	-----	6	-----	6	
Camden Iron Works.....	*20 in..	-----	1	-----	1	
	Totals.....	-----	-----	1,006	270	736

* Flag.

Schedule of Pipe and Castings Inspected during 1911.

	Manufacturer.	Size in inches.		Inspected.	Rejected.	Accepted.
		Pipe.	Special castings.			
Bureau of Correction.	Donaldson Iron Company.....	3 in..	-----	150	25	125
	Donaldson Iron Company.....	6 in..	-----	192	65	127
	Totals.....	-----	-----	342	90	252
Contractors.	R. D. Wood & Co.....	6 in..	-----	667	100	567
	R. D. Wood & Co.....	8 in..	-----	163	56	107
	R. D. Wood & Co.....	-----	Small specials	2	1	1
	Donaldson Iron Company.....	8 in..	-----	160	35	125
	Donaldson Iron Company.....	8 in..	Small specials	2	-----	2
	U. S. C. I. Pipe and Foundry Company.....	6 in..	-----	182	-----	182
	J. Thompson & Company.....	-----	Small specials.....	23	3	20
Totals.....	-----	-----	1,199	195	1,004	

Distribution Expenses during the Year 1911. Including Expenses of Main Office, Purveyors' Districts and Meter Shops.

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Material and labor	First District	Second District	Third District	Fourth District	Fifth District	Sixth District	Seventh District	Distribution	Meter Shops	Main Office	Totals
Lead -----	\$295 59	\$293 19	\$1,187 50	\$588 82	\$297 77	\$1,181 18	\$2,069 01				\$5,918 03
Gasket -----	49 46	27 98	68 25		18 86	51 27	131 72				317 54
Coke -----	32 40	28 75	97 50	42 00	21 00		28 75				250 40
Wood -----						83 80					83 80
Straight pipe -----								\$51,046 55			51,046 55
Small specials -----								14,812 49			14,812 49
Large specials -----								91 91			91 91
Frames and covers-----	708 01	379 27	823 15	711 71	93 97	591 74	476 84				3,784 63
Hauling -----					487 65	6 00					493 65
Transportation and hotel-----								2,823 48			2,823 48
Supplies, tools, small stores, etc. -----	1,028 80	779 89	739 60	1,144 62	435 00	681 38	648 59	3,341 58	\$233 76	\$117 45	9,150 67
Plumbing and plumbing supplies -----					11 10	45 68					56 78
Meters, etc. -----									660 87		660 87
Brick, stone, lime and cement -----	86 84	167 18	1 25		26 25	9 75	389 00				671 27
Lumber -----	4,027 40	226 53	138 13	100 40	581 52	1,583 00	75 15	600 40			7,332 53
Hay, feed, etc. -----	848 26	1,011 25	1,215 06	919 62	433 79	432 59	741 73				5,602 30
Stable supplies -----	226 36	49 10	401 45	7 00	232 78	31 03	11 08				936 80

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Distribution Expenses during the Year 1911—Continued.

Material and labor	First District	Second District	Third District	Fourth District	Fifth District	Sixth District	Seventh District	Distribution	Meter Shops	Main Office	Totals
Stable repairs -----	\$82 60	\$173 20	\$187 05	\$174 05	\$56 55	\$111 10	\$87 00	-----	-----	-----	\$871 55
Stable medicines -----	2 50	16 50	14 75	37 75	9 00	31 25	23 50	-----	-----	-----	135 25
Stable shoeing -----	139 44	307 20	262 85	232 40	93 50	179 75	95 70	-----	-----	-----	1,310 84
Supplies, stationery -----	45 30	76 46	50 81	52 77	29 37	54 23	41 67	-----	-----	-----	350 61
Wages-----											
{ Per diem-----	31,359 21	30,273 55	46,023 58	20,703 88	8,432 47	30,859 45	33,374 23	-----	-----	-----	211,031 37
{ Salary-----	5,120 93	4,538 54	8,290 17	9,186 09	3,368 34	5,392 32	5,398 55	-----	-----	-----	41,294 91
Total cost of labor and material on account of distribution -----	\$44,053 10	\$38,358 59	\$59,501 10	\$33,901 11	14,623 92	\$11,325 52	\$13,583 52	\$72,716 41	\$894 63	\$117 45	\$359,080 35
Buildings, grounds and reservoirs -----	\$28 00	-----	\$717 49	\$221 65	\$8,062 75	\$693 00	\$61,216 86	-----	-----	-----	\$70,939 75
Meter department -----	-----	-----	1,939 90	54 25	-----	50 00	-----	-----	-----	-----	2,044 15
Bureau of Highways-----	-----	-----	-----	669 31	-----	-----	-----	-----	-----	-----	669 31
Court witnesses -----	-----	-----	26 77	-----	-----	-----	-----	-----	-----	-----	26 77
Total labor and materials....	\$44,081 10	\$38,358 59	\$62,185 26	\$34,846 32	32,691 67	\$42,068 52	\$104,800 38	\$72,716 41	\$894 63	\$117 45	\$432,760 33

APPENDIX D

REPORT OF THE REGISTRAR

January 16, 1912.

MR. FRED. C. DUNLAP,
Chief, Bureau of Water.

SIR:—I herewith submit Annual Report of the operations of this Department for the year ending December 31, 1911.

The receipts from all sources for the year 1911 are as follows:

I. Collected by the Bureau of Water Rents, Receiver of Taxes.....	\$4,805,640 28
II. Collected for Fees for Searches, Miscellaneous Tax Office, Receiver of Taxes.....	2,638 75
III. Collected by City Solicitor for water pipe frontage	28,398 69
IV. Collected by Department of Supplies for Bureau of Water	3,694 08
V. Collected by Highway Bureau for ferrules delivered by Bureau of Water.....	7,844 00
Total for year 1911.....	\$4,848,215 80
Total for year 1910.....	4,586,705 65
Total increase for year 1911.....	\$261,511 15

The revenue received by the Bureau of Water Rents, Receiver of Taxes, for year 1911, as compared with the receipts of 1910, shows an increase of \$264,171.39.

The fees for searches received by the Miscellaneous Tax Office, Receiver of Taxes, for year 1911, as compared with the receipts of 1910, show an increase of \$81.25.

The collections made by the City Solicitor for water pipe frontage, compared with the receipts of 1910, show a decrease of \$3,932.57.

The amount received by the Department of Supplies for the sale of material, as compared with the receipts for 1910, shows an increase of \$2,810.05.

The receipts of the Bureau of Highways for ferrules delivered by this Department on permits issued, as compared with 1910, show a decrease of \$1,723.

The City Solicitor makes no return of collections for miscellaneous work done by the Bureau of Water.

The total increase in revenue as compared with the year 1910 amounts to \$261,511.15.

I submit herewith detailed statements of receipts for years 1910 and 1911; also, Department expenses for same period.

I forward herewith report of the operations of the Meter Department for the year ending December 31, 1911; tables showing the number of shut-off orders issued by this office for the collection of delinquent water rents; attachments made by Purveyors in accordance with permits issued by this Department; detailed accounts of permits issued for various purposes, together with the total number of premises and fixtures supplied by City water.

With a corps of 24 inspectors, the total number of inspections made in 1911 amounts to 62,370, as compared with 54,382 for the year 1910. During the past year many wards have been completely reinspected. The total number of permits issued for the year 1911 amounts to 22,008.

In closing, would state that the efficient service and

faithful performance of duty rendered by the inspectors and clerks have made possible the handling and systematizing of the large volume of business of this Department with results which are encouraging.

Respectfully submitted,

JAMES F. McCRUDDEN,

Registrar.

1911.

1911	Water Rents Paid by Schedule Rates on Existing Connections				Paid by meter rates, current and delinquent.	Permits and fractional rates	Liens	Interest	Fees for searches	Miscellaneous	Water pipe frontage paid to the Receiver of Taxes	Water pipe frontage collected through the Department of Law	Totals
	Rents		Penalties										
	Current	Delinquent	Current	Delinquent									
January -----		\$19,132 65		\$2,807 43	\$6,480 37	\$3,811 89	\$12 00	\$20 42	\$188 50	\$69 52	\$1,332 67	\$824 47	\$37,679 92
February -----	\$251,543 95	8,061 45		1,200 43	46,472 38	6,466 58	8 00	25 33	184 00	4,121 90	7,043 82	1,002 05	326,729 89
March -----	230,283 64	7,210 47		1,084 01	62,191 60	16,623 92	6 00	7 38	278 50	13,526 71	12,479 96	1,526 46	345,250 65
April -----	277,728 32	3,330 90		504 72	2,709 14	13,118 19	3 00	11 68	232 50	23 39	13,193 67	1,298 49	312,154 00
May -----	2,755,795 45	3,335 85		472 98	53,801 72	17,820 37	8 00	12 46	265 00	294 98	11,606 46	3,478 75	2,846,801 97
June -----	80,170 05	1,994 00	\$3,309 41	302 25	36,283 70	21,887 33	14 00	42 69	230 00	863 37	10,930 02	2,895 22	158,915 04
July -----	44,370 00	866 00	2,193 57	76 75	8,378 61	14,255 90			200 00	156 93	18,484 62	2,848 52	91,830 90
August -----	153,904 63	700 03	7,018 22	103 35	72,974 08	17,844 50	1 00	1 05	168 00	290 20	18,671 46	3,250 63	274,927 20
September -----	28,601 20	791 25	3,595 83	119 98	21,195 21	9,280 03	10 00	35 55	197 25	128 64	13,468 89	1,713 98	82,153 84
October -----	45,502 51	296 50	6,876 44	43 74	12,539 45	10,656 31	17 00	34 15	268 25	200 00	13,071 45	3,282 11	92,807 91
November -----	58,505 63	519 41	8,776 50	88 45	60,362 32	5,972 28	3 00	2 49	222 25	34 30	7,639 73	2,380 80	144,507 21
December -----	49,496 50	816 45	7,193 65	130 55	46,394 01	9,009 31	23 00	56 40	214 50	240 06	5,924 60	3,297 16	122,829 19
1911 -----	3,975,901 93	\$17,114 93	\$38,966 62	\$3,934 59	432,812 59	\$146,760 64	105 00	249 60	2,638 75	19,949 00	136,842 35	28,398 69	\$4,836,677 72
1910 -----	5,803,274 31	39,024 02	38,668 10	5,822 65	416,279 42	147,105 33	190 00	449 53	2,557 50	40,099 97	50,555 51	32,331 26	4,576,357 65
Increase -----	\$172,630 65	\$8,090 91	\$298 52	\$1,111 94	16,533 17				\$81 25		\$86,286 84		\$260,320 07
Decrease -----						344 69	\$85 00	\$199 98		\$20,150 97		\$3,932 57	

New Meters Set during the Year 1911.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size							Total	Remarks	
						1/4 inch	5/8 inch	3/4 inch	1 inch	1 1/2 inch	2 inch	3 inch			4 inch
1	Penna. Railroad Co.	Meadow and Reed sts.....	Freight office.....	Sept. 12.	Hersey				1					1	Private.
1	Publicker Cooperage Co.	W. side Meadow st., 126 feet north of Morris st.....	Cooper shop.....	Oct. 9.	Hersey								1	1	
1	Yellow Pine Co.....	Reed st. wharf.....	Office, etc.....	Nov. 1.	Hersey			1						1	Private.
1	J. Cherodsky.....	506-8 Morris st. and rear.....	Bath house.....	Dec. 15.	Gem.....							1		1	
2	Penna. Railroad Co	Swanson and Federal sts.....	Freight house.....	Feb. 17.	Gem.....							1		1	Private.
2	Penna. Railroad Co	Swanson and Federal sts.....	Freight house.....	Feb. 28.	Hersey				1					1	Private.
2	Penna. Railroad Co	Swanson and Federal sts.....	Freight house.....	Feb. 28.	Gem.....							1		1	Private.
2	Southwark Ice Co..	S. E. cor. 12th and Washington ave....	Ice manfg.....	Nov. 20.	Nilo.....								1	1	Experimental.
2	Southwark Ice Co..	S. E. cor. 12th and Washington ave....	Ice manfg.....	Nov. 22.	Nilo.....								1	1	Experimental.
3	Penna. Railroad Co	Swanson and Christian sts.....	Freight station....	Feb. 15.	Hersey				1					1	Private.
5	David M. Ellis.....	N. E. cor. American and Chancellor sts.	Miscellaneous	Jan. 5.	Worthington.....				1					1	
5	William O. Lane....	612-14 Chestnut st.....	Newspaper	July 10.	Worthington.....					1				1	
5	Curtis Pub. Co.....	N. W. cor. 6th and Walnut sts.....	Printing, etc.....	July 17.	Hersey								1	1	Private.
5	Curtis Pub. Co.....	N. W. cor. 6th and Walnut sts.....	Printing, etc.....	July 18.	Hersey								1	1	

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size						Total	Remarks
						$\frac{1}{4}$ inch	$\frac{1}{2}$ inch	$\frac{3}{4}$ inch	1 inch	$1\frac{1}{4}$ inch	2 inch		
5	Curtis Pub. Co.....	N. W. cor. 6th and Walnut sts.....	Printing, etc.....	July 21.	Hersey.....							1	Private.
6	George A. Bisler.....	245-55 N. 6th st.....	Paper boxes.....	Jan. 7.	Crown.....					1		1	Private.
8	Union League Club.....	S. W. cor. Broad and Sansom sts.....	Club house.....	Jan. 31.	Crown.....			1				1	Private 6-in. fire connection.
8	Locust Laundry.....	236-42 S. 9th st.....	Laundry.....	Mch. 7.	Crown.....				1			1	
8	Locust Laundry.....	236-42 S. 9th st.....	Laundry.....	Mch. 7.	Gem.....					1		1	
8	Union League Club.....	S. W. cor. Broad and Sansom sts.....	Club house.....	Aug. 10.	Gem.....				1			1	Private.
8	Acorn Club.....	616 Walnut st.....	Club house.....	Nov. 13.	Empire.....			1				1	Private.
8	S. S. White Dental Depot.....	11-17 S. 12th st.....	Dental supplies.....	Nov. 13.	Trident.....			1				1	Private 6-in. fire connection.
9	Penna. Railroad Co.....	1920 Filbert st.....	Storage, etc.....	Dec. 1.	Empire.....			1				1	Private.
9	Penna. Railroad Co.....	1710 Filbert st.....	Storage, etc.....	Dec. 1.	Empire.....			1				1	Private.
9	Penna. Railroad Co.....	1600 Filbert st.....	Power house.....	Dec. 1.	Empire.....			1				1	Private.
9	Penna. Railroad Co.....	1502 Filbert st.....	Power house.....	Dec. 1.	Gem.....						1	1	Private.
9	Penna. Railroad Co.....	N. E. cor. 18th and Market sts.....	Express office.....	Dec. 4.	Gem.....					1		1	Private.
9	Penna. Railroad Co.....	N. E. cor. 16th and Filbert sts.....	Power house.....	Dec. 5.	Gem.....						1	1	Private.

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size							Total	Remarks
						½ inch	¾ inch	1 inch	1½ inch	2 inch	3 inch	4 inch		
9	Penna. Railroad Co	1616-18 Filbert st.....	Miscellaneous	Dec. 6.	Gem					1			1	Private.
9	Penna. Railroad Co	1716 Filbert st.....	Cab stables.....	Dec. 6.	Empire			1					1	Private.
9	Penna. Railroad Co	Broad Street Station.....	Station	Dec. 6.	Gem							1	1	Private.
9	Penna. Railroad Co	1816-18 Filbert st.....	Storage	Dec. 7.	Empire			1					1	Private.
9	Penna. Railroad Co	E. side 16th st., south of Filbert st.....	Electric lights.....	Dec. 14.	Gem					1			1	Private.
10	Thos. M. Seeds.....	1208-16 Race st.....	Manufacturing	Jan. 14.	Gem					1			1	
10	Stephen Greene	N. E. cor. 16th and Arch sts.....	Printing house.....	Dec. 8.	Empire			1					1	Private.
11	Dept. Wharves, Docks and Ferries	Vine Street Pier.....	City Pier.....	Sept. 25.	Arrow					1			1	Private.
11	Dept. Wharves, Docks and Ferries	Vine Street Pier.....	City Pier.....	Sept. 25.	Arrow					1			1	Private.
11	Dept. Wharves, Docks and Ferries	Vine Street Pier.....	City Pier.....	Sept. 25.	Arrow					1			1	Private.
11	Dept. Wharves, Docks and Ferries	Vine Street Pier.....	City Pier	Sept. 19.	Arrow					1			1	Private.
11	Dept. Wharves, Docks and Ferries	Vine Street Pier.....	City Pier.....	Sept. 25.	Arrow					1			1	Private.

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size						Total	Remarks	
						¼ inch	½ inch	¾ inch	1 inch	1½ inch	2 inch			3 inch
11	Dept. Wharves, Docks and Ferries	Vine Street Pier	City Pier	Sept. 25.	Arrow							1	1	Private.
11	Dept. Wharves, Docks and Ferries	Vine Street Pier	City Pier	Sept. 25.	Hersey							1	1	Private.
11	William Max	114-46 Noble st.	Pipe manfg.	Dec. 28.	Empire				1				1	Private.
12	Henry Hess Bwg. Co.	847-51 N. 4th st.	Brewery	Apr. 13.	Keystone						1		1	Private.
12	Henry Hess Bwg. Co.	847-51 N. 4th st.	Brewery	May 10.	Keystone						1		1	Private.
12	Henry W. Wampole	24-32 Fairmount ave.	Various	Nov. 18.	Empire				1				1	Private.
13	Phila. and Reading Railway Co.	N. E. cor. Spring Garden and Percy sts.	Station	Apr. 12.	Worthington						1		1	Private.
13	Hygea Ice and Cold Storage Co.	316-20 N. 7th st.	Ice mfrs.	July 24.	Gem						1		1	Private.
14	Packard Motor Car Co.	E. side Broad st., from Wood to Pearl st.	Garage, etc.	Nov. 10.	Empire				1				1	Private fire meter.
14	John H. Smaltz	S. E. cor. 12th and Wood sts.	Manufacturing	Dec. 15.	Empire				1				1	Private fire.
15	Nonpariel Laundry	Broad and Melon sts.	Laundry	Mch. 8.	Crown						1		1	

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size							Total	Remarks
						½ inch	¾ inch	1 inch	1¼ inch	2 inch	3 inch	4 inch		
15	Nonpareil Laundry	Broad and Melon sts.	Laundry	Mch. 8	Crown					1			1	
15	Walker Electric Co.	233s Noble st.	Electric supplies	Mch. 15	Empire			1					1	Private fire.
15	Phila. and Reading Railway Co.	Hamilton st., from Twentieth to Twenty-first st.	Shops, etc.	June 27	Gem							1	1	Private.
15	Phila. and Reading Railway Co.	Hamilton st., from Twenty-first to Twenty-second st.	Round house	June 28	Gem							1	1	Private.
15	Phila. and Reading Railway Co.	Hamilton, from Twenty-first to Twenty-second st.	Round house	June 29	Gem							1	1	Private.
15	S. B. & B. W. Fleisher	28th and Callowhill sts.	Store house	Nov. 13	Hersey			1					1	Private.
15	C. C. Newton & Co.	2314-16 Wood st.	Machinists	Dec. 30	Gen					1			1	
16	Baltimore and Ohio Railroad	Pier No. 40 N. Delaware ave.	Freight station	Aug. 30	Nash			1					1	Private.
18	Wm. Cramp Ship and Engine Co.	Richmond and Ball sts.	Shops	May 17	Hersey			1					1	Private fire.
18	Penna. Railroad Co	Beach st., near Laurel st.	Freight depot	Jan. 13	Hersey			1					1	Private fire.
18	Wm. Cramp Ship and Engine Co.	Richmond and Ball sts.	Shops, etc.	May 17	Hersey			1					1	Private fire.

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size						Total	Remarks
						½ inch	¾ inch	1 inch	1½ inch	2 inch	3 inch		
18	Morse, Williams Co.	1105 Frankford ave.	Elevators	Aug. 10.	Empire	1						1	Private.
18	Morse, Williams Co.	1105 Frankford ave.	Elevators	Aug. 10.	Empire	1						1	Private.
19	Penna. Railroad Co	Montgomery ave. and Front st.	Freight depot	Jan. 18.	Hersey			1				1	Private fire.
19	Schofield, Mason & Co.	Fairhill, Cumberland and Reese sts.	Carpets	July 20.	Hersey			1				1	Private fire.
21	John P. Holt	N. E. cor. High and Mallory sts.	Worsteds	Jan. 23.	Worthington			1				1	Private fire.
21	John P. Holt	N. E. cor. High and Mallory sts.	Worsteds	Jan. 24.	Worthington			1				1	Private fire.
21	John P. Holt	E. side Main st., 7th house north of Ridge ave.	Mill	Jan. 31.	Trident			1				1	Private fire.
21	John P. Holt	E. side Main st., 7th house north of Ridge ave.	Mill	Jan. 31.	Worthington			1				1	Private fire.
21	John P. Holt	E. side Main st., 7th house north of Ridge ave.	Mill	Mch. 16.	Worthington			1				1	Private.
21	John P. Holt	High and Mallory sts.	Mill	Apr. 19.	Hersey			1				1	Private.
21	Phila. and Reading Railway Co.	Green lane and Cresson st.	Stand pipe	June 13.	Eureka					1		1	Private.
22	National Umbrella Frame Co.	S. W. side Belfield ave., south of Penn	Manfg.	Jan. 30.	Trident			1				1	Private.

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size							Total	Remarks
						½ inch	¾ inch	1 inch	1½ inch	2 inch	3 inch	4 inch		
22	Phila. and Reading Railway Co. -----	Chelton Avenue Station.....	Station and stand pipe.....	May 24.	Eureka.....							1	1	Private.
22	Phila. and Reading Railway Co. -----	Chestnut Hill Station.....	stand pipe.....	May 25.	Eureka.....							1	1	Private.
22	George Woodward, M. D.	N. W. cor. McCallum st. and Wissa hickon drive.....	Residence	Nov. 9.	Crown				1				1	
23	Edgewater Print Works	Frankford ave. and Old Front st.....	Dye works.....	Feb. 15.	Crown.....					1			1	
23	Fayette R. Plumb.....	Tucker and James sts.....	Pool works.....	June 22.	Niagara.....			1					1	Private fire.
23	Phila. and Reading Railway Co.	S. W. side Penn st., 91 feet north of Unity st.....	Tank	Aug. 15.	Eureka.....				1				1	Private.
23	Frankford Hosiery Mills	Unity st. and Adams road.....	Hosiery	Aug. 30.	Hersey			1					1	Private fire.
23	Frankford Co-Operative Co.	Orthodox and Horrocks sts.....	Hosiery	Nov. 10.	Gem.....					1			1	
23	Phila. and Reading Railway Co.	410-18 Frankford ave.....	Station	Nov. 27.	Hersey			1					1	Private.
23	Phila. and Reading Railway Co.	443 Franklin st.....	Freight depot.....	Nov. 28.	Hersey	1							1	Private.

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size						Total	Remarks		
						½ inch	¾ inch	1 inch	1½ inch	2 inch	3 inch			4 inch	6 inch
23	C. A. Wardle.....	1666 Oxford st.....	Laundry	Dec. 13.	American.....				1			1			
23	R. J. Earderer Thr. Co.	S. W. cor. Unity and Elizabeth sts.....	Mill	Dec. 29.	Empire.....			1				1	Private.		
24	Phila. Stock Yard..	30th and Race sts.....	Abattoir	Mch. 19.	Crown.....						1	1			
24	McCann Estate	3901-3 Market st.....	Horse trough.....	Apr. 7.	Crown.....		1					1			
25	Phila. and Reading Railway Co.	William and Brabant sts.....	Freight station.....	Mch. 10.	Crown.....						1	1			
25	Phila. and Reading Railway Co.	William and Brabant sts.....	Freight station.....	Mch. 10.	Crown.....						1	1			
25	Elwood Allen Lmb. Co.	Trenton ave. and Ann st.....	Lumber sheds.....	Mch. 15.	Empire.....			1				1	Private fire.		
25	C. F. Simonims Sons	Trenton and Allegheny aves.....	Dye house.....	Mch. 18.	Crown.....				1			1			
25	C. L. Klauder Co..	Allegheny ave. and B st.....	Leather mfr.....	Mch. 29.	Crown.....				1			1			
25	David Harvey & Son	Rear S. W. cor. Allegheny ave. and Janney st.....	Knit goods.....	Sept. 15.	Crown.....				1			1			
25	Chas. L. Klauder....	Allegheny ave. and B st.....	Leather mfr.....	Apr. 27.	Hersey				1			1	Private fire.		
25	Merchant's Ice Co..	3080 Emerald st.....	Ice plant.....	Oct. 15.	Gem.....						1	1	Experimental.		

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size							Total	Remarks
						¼ inch	½ inch	¾ inch	1 inch	1½ inch	2 inch	3 inch		
25	David Harvey & Son	Rear S. W. cor. Allegheny ave. and Janney st.....	Knit goods.....	Oct. 30.	Empire.....				1				1	Private fire.
25	Phila. and Reading Railway Co.	2821 Richmond st.....	Freight station.....	Nov. 27.	Hersey.....				1				1	Private.
25	Phila. and Reading Railway Co.	S. side Cambria st., 450 feet east of Richmond st.....	Shops.....	Nov. 27.	Hersey.....			1					1	Private.
25	Phila. and Reading Railway Co.	2801 Richmond st.....	Office.....	Nov. 28.	Hersey.....		1						1	Private.
26	Hastings & Morrison	1510 Washington ave.....	Marble works.....	Mch. 13.	Gem.....					1			1	Experimental.
27	Home for Indigent Widows, etc.	3609-19 Chestnut st.....	Home.....	Jan. 4.	Hersey.....					1			1	Private.
27	Penna. Railroad Co.	31st and Chestnut sts.....	Milk platform.....	Jan. 12.	Hersey.....			1					1	Private fire.
27	Zoological Laboratory, U. of P.....	Old Pine st., east of 38th st.....	Laboratory.....	July 1.	Worthington.....						1		1	Private.
27	Joseph B. Thomas..	3605-7 Chestnut st.....	Apartment house.....	Aug. 5.	Worthington.....			1					1	Private fire.
28	North Penn Ice Co.	S. side Sedgley ave., 323 feet west of Twenty-fifth st.....	Ice plant.....	Dec. 11.	Hersey.....						1		1	Private.

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size							Total	Remarks
						½ inch	¾ inch	1 inch	1½ inch	2 inch	3 inch	4 inch		
29	Com'wlth Bwg. Co.	28th and Cambridge sts.	Office	Mch. 2	Hersey		1						1	Private.
29	Com'wlth Bwg. Co.	28th and Cambridge sts.	Bottling house	Mch. 3	Hersey				1				1	Private.
29	Com'wlth Bwg. Co.	122-24-26 N. 26th st.	Stables	Mch. 30	Hersey			1					1	Private.
29	Bergner & Engel Bwg. Co.	N. E. cor. 31st and Jefferson sts.	Ice plant	May 28	Hersey					1			1	Private.
30	Frederick R. Gerry	Schuykill ave. and Peltz st.	Furniture	May 29	Hersey			1					1	Private fire.
31	James Kitchenman	S. E. cor. Huntingdon and Jasper sts.	Office	Jan. 17	Hersey		1						1	Private.
31	James Kitchenman	S. E. cor. Huntingdon and Jasper sts.	Dye house	Apr. 1	Hersey					1			1	
31	Weisbrod & Hess	2433-40 Frankford ave.	Brewery	May 10	Hersey					1			1	
31	Wm. H. Emsley	N. W. cor. Adams and Emerald sts.	Dyeing, etc.	May 26	Hersey			1					1	Private fire.
31	Jas. & G. D. Bromley	Adams and Jasper sts.	Various	June 28	Hersey			1					1	Private fire.
31	Williamson Bros.	Letterly and Moyer sts.	Machinists	June 29	Hersey					1			1	Private.
31	Williamson Bros.	N. W. cor. Letterly and Moyer sts.	Stable	June 29	Hersey			1					1	Private.
31	Thomas Bromley	N. E. cor. Jasper and York sts.	Mill	July 10	Hersey			1					1	Private fire.
31	Williamson Bros.	S. W. cor. Cumberland and Aramingo sts.	Machinists	July 28	Hersey					1			1	Private.

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size							Remarks		
						¾ inch	¾ inch	¾ inch	1 inch	1½ inch	2 inch	3 inch		4 inch	6 inch
31	Thomas Brouley	Jasper and York sts.	Dye house	Aug. 7.	Hersey				1					1	Private fire.
31	Williamson Bros.	S. W. cor. Letterly and Moyer sts.	Machinist	Aug. 14	Tredent				1					1	Private fire.
31	William Brady	2510 E. Cumberland st.	Rag warehouse	Sept. 26.	Worthington				1					1	Private fire.
31	Thos. W. Buck Hosiery Co.	1818-28 Boston ave.	Hosiery mill	Nov. 15.	Hersey					1				1	Private fire.
31	E. Whitesides	S. W. cor. Amber and Dauphin sts.	Hosiery mill	Nov. 28.	Hersey				1					1	Private.
31	Wm. H. Emsley & Son	N. W. cor. Adams and Emerald sts.	Dyeing, etc.	Dec. 2.	Hersey						1			1	Private.
31	Williamson Bros.	Cumberland and Aramingo sts.	Machinists	Dec. 22.	Hersey				1					1	Private.
32	Excelsior Laundry	N. E. cor. 19th and Montgomery ave.	Laundry	Mch. 11.	Crown						1			1	Experimental.
32	Standard Dental Co	25th and Norris sts.	Dental supplies	Aug. 29.	Trident				1					1	Private fire.
33	F. A. Bachman & Co.	W. side 2d st., 165 feet north of Somerset st.	Worsted mill	Mch. 31.	Hersey		1							1	Private.
33	Baxter, Kelly & Faust	C and Thoga sts.		Sept. 8.	Empire				1					1	Private fire.
34	Lewis Jones, Jr.	63d and Lebanon sts.	Power house	Jan. 30.	Hersey				1					1	Private.

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size							Total	Remarks
						$\frac{1}{4}$ inch	$\frac{1}{2}$ inch	$\frac{3}{4}$ inch	1 inch	$1\frac{1}{2}$ inch	2 inch	3 inch		
34	Domestic Ice Co.	31 N. Allison st.	Ice plant	July 26	Hersey				1				1	Private.
36	Phosphor-Bronze Smelting Co.	S. E. cor. 23d and Washington ave.	Foundry	May 9	Empire				1				1	Private.
36	Atlantic Refining Co.	Point Breeze	Oil works	June 16	Hersey					1			1	Private.
36	McAvoy & Morris	31st and Dickinson sts.	Brick yard	June 21	Hersey				1				1	Private.
36	National Alloy Co.	1514-22 S. 25th st.	Chemists	June 30	Crown					1			1	
36	Phila. Brick Co.	23d and Passyunk ave.	Brick yard	July 3	Hersey				1				1	Private.
36	Phila. Brick Co.	25th and Passyunk ave.	Brick yard	July 3	Hersey				1				1	Private.
37	Pilgrim Laundry	Glenwood ave. and Broad st.	Laundry	Mch. 7	Crown					1			1	
37	Penna. Railroad Co.	Broad st. and Sedgley ave.	Freight station	July 23	Hersey					1			1	Private.
37	Carey Brothers	N. W. cor. 10th and Colona sts.	Wall paper	Sept. 5	Gem						1		1	Private fire.
37	Keystone Theatre Co.	S. E. cor. 11th and Lehigh ave.	Theater	Sept. 7	Hersey				1				1	Private fire.
38	Phila. and Reading Railway Co.	2d and Allegheny ave.	Freight station	Mch. 20	Empire				1				1	Private fire.
38	Electric Storage Battery Co.	19th and Allegheny ave.	Electric supplies	July 6	Hersey							1	1	Private.

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size								Remarks	
						¼ inch	½ inch	¾ inch	1 inch	1½ inch	2 inch	3 inch	4 inch		6 inch
38	Wayne Ice Co.	1100 Wayne ave.	Ice plant.	Oct. 1	Gem.								1	1	Experimental.
38	Nicetown Plate Washer Co.	Juniata and Clarissa sts.	Iron works.	Nov. 4	Crown.				1					1	
38	Nicetown Plate Washer Co.	Juniata and Clarissa sts.	Iron works.	Nov. 4	Crown.				1					1	
38	Adams & Westlake Co.	N. side Bellevue ave., west of Twenty-second st.	Brass foundry.	Nov. 24	Hersey.						1			1	Private.
38	Adams & Westlake Co.	N. side Bellevue ave., west of Twenty-second st.	Brass foundry.	Dec. 11	Empire.				1					1	Private fire.
39	U. S. Navy Yard.	League Island.	Barracks, etc.	June 15	Gem.							1		1	Private.
39	U. S. Navy Yard.	League Island.	Barracks, etc.	Oct. 17	Gem.								1	1	Private.
39	Penna. Salt Mfg. Co.	S. W. cor. Weccacoe ave. and Porter st.	Salt refining.	Dec. 18	Hersey.				1					1	Private.
40	Baltimore and Ohio Railroad Co.	58th and Woodland ave.	Station.	Mch. 1	Crown.			1						1	For building purposes.
42	John & Jas. Dobson	Stenton ave. and Godfrey st.	Mill.	June 29	Gem.								1	1	

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size								Total	Remarks
						1/2 inch	3/4 inch	1 inch	1 1/4 inch	2 inch	3 inch	4 inch	6 inch		
43	Holland Laundry	17th and Cayuga sts.....	Laundry	Mch. 10.	Crown						1			1	
43	Holland Laundry	17th and Cayuga sts.....	Laundry	Mch. 10.	Crown						1			1	
43	Phila. Bwg. Co.	6th and Clearfield sts.....	Brewery	Mch. 14.	Crown			1						1	
43	Phila. Bwg. Co.	3032 Fairhill st.....	Bottling	Mch. 14.	Crown		1							1	
43	Chas. Spott	3746-50 N. Randolph st.....	Bottler	July 28.	Hersey			1						1	Private.
43	Independent Bwg. Co.	6th and Clearfield sts.....	Brewery	Aug. 11.	Hersey					1				1	Private.
43	Hohlfeld Mfg. Co.	10th and Sedgley ave.....	Lace curtains, etc.	Oct. 17.	Trident			1						1	Private.
44	Penna. Railroad Co	48th and Parkside ave.....	Shops	Jan. 10.	Hersey			1						1	Private fire.
44	Penna. Railroad Co	48th and Parkside ave.....	Shops	Jan. 10.	Hersey			1						1	Private fire.
44	Penna. Railroad Co	48th and Parkside ave.....	Shops	Jan. 21.	Hersey			1						1	Private fire.
44	Chalfant Brothers	1314 N. 44th st.....	Lumber yard	Mch. 7.	Hersey			1						1	Private fire.
45	Dill & Collins	Tioga st., east of Richmond st.....	Pulp mill	Mch. 3.	Hersey			1						1	Private.
45	Vornhold Wall Paper Co.	Memphis and Tioga sts.....	Paper mfr.	Mch. 30.	Hersey			1						1	Private fire.

New Meters Set during the Year 1911—Continued.

Wards	Occupant	Location	Business	Date when set	Name of meter	Size								Total	Remarks
						$\frac{1}{4}$ inch	$\frac{3}{8}$ inch	$\frac{1}{2}$ inch	1 inch	1 $\frac{1}{2}$ inch	2 inch	3 inch	4 inch		
45	United Gas Improvement Co.	Buckius lane and Frankford ave.....	Gas office.....	July 7.	Hersey				1					1	Private.
45	F. W. Tunnell Co....	Wheat Sheaf lane and Gaul st.....	Leather	July 17.	Hersey				1					1	Private fire.
45	Berg Co.	Bath and Ontario sts.....	Glue, etc.....	Oct. 25.	Hersey				1					1	Private, covers one machine.
45	O'Neill Bros.	Emerald and Willow sts.....	Waste	Dec. 19.	Crown					1				1	
46	Quaker City Laun dry	18th and Ludlow sts.....	Laundry	Mch. 7.	Gem						1			1	
46	W. H. Felton.....	1611 Cedar ave.....	Residence	July 25.	Trident.....		1							1	Experimental.

The following is a detailed report of the receipts of the Bureau of Water, as collected by the Water Rent Tax Office, Receiver of Taxes, up to and including December 31, 1911, with report of corresponding period of 1910.

	1910	1911	Difference
Rents -----	\$3,803,274 31	\$3,975,904 06	\$172,630 65
Penalties -----	38,668 10	38,966 62	298 52
Delinquent -----	39,024 02	47,114 93	8,090 91
Penalties -----	5,822 65	6,934 50	1,111 94
Liens -----	190 00	105 00	85 00*
Interests -----	449 58	249 60	199 98*
Permits -----	147,105 33	146,760 64	344 69*
Meters -----	416,279 42	432,812 59	16,533 17
Pipe -----	50,555 51	136,842 35	86,286 84
Special -----	40,099 97	19,949 00	20,150 97*
Total -----	\$4,541,468 89	\$4,805,640 28	\$264,171 39

*Decrease.

The permit item of the above tabulation represents bills issued direct from this office and is divided into the following items:

	1910		1911		Difference
	No.	Amount	No.	Amount	
Additional fixtures -----	5,568	\$11,406 29	6,392	\$13,755 81	\$7,349 52
Building permits -----	1,776	18,747 11	1,953	21,738 61	2,991 50
Additional water rents	3,599	34,910 93	1,705	18,975 07	15,935 91*
Department ferrules ----	1,565	17,163 00	1,862	15,816 00	1,347 00*
Special permits -----	79	1,585 75	104	1,981 29	395 54
New houses -----	12,597	63,292 20	10,629	69,127 86	5,835 66
Ferrules drawn -----	334	-----	476	366 00	366 00
Total -----	25,518	\$147,105 33	23,121	\$146,760 64	\$344 69*

*Decrease.

Unpaid permits to December 31, 1911, amount to \$7,395.34, representing the following:

Additional	\$3,507 45
New houses	569 70
Building permits	1,331 99
Fractional rent	1,508 00
Special permits	15 00
Additional permits	463 20
Total	<u>\$7,395 34</u>

Department Expenses.

Salaries	\$30,235 36
Per diem wages	27,080 45
Per diem wages (miscellaneous labor).....	1,398 21
Extra clerk hire for the writing of water rent duplicates	3,593 95
Postage, transportation, stationery and sup- plies	3,209 18
Total	<u>\$65,517 15</u>

Shut-off Orders for Delinquent Water Rents, 1911.

First District	939
Second District	589
Third District	740
Fourth District	688
Fifth District	109
Sixth District	732
Seventh District	1,105
Total	<u>4,902</u>

ATTACHMENTS, ETC., MADE BY THE PURVEYORS, IN
ACCORDANCE WITH PERMITS ISSUED BY THE BUREAU OF
WATER.

New Attachments.

DISTRICTS	½-inch	¾-inch	¾-inch	1-inch	1¼-inch	1½-inch	2-inch	3-inch	4-inch	6-inch	Total
First	1,199	70	25	13	2	11	7	2	1		1,330
Second	114	37	44	25	10	6	13				249
Third	1,417	54	17	19	2	17	21	5	6	8	1,566
Fourth	776	4	6	9	4	6	13	1	1	2	822
Fifth	248	46	2	1		1	3				301
Sixth	1,189	97	44	13	1	2	5		1	3	1,356
Seventh	2,354	173	30	25	3	6	9	2	4	1	2,607
Totals.....	7,297	481	168	105	22	49	71	10	13	14	8,230

Meters.

	1910	1911	Increase
Meters in use.....	1,895	2,011	116

Permits Issued During 1911.

Aquaria	2
Bakeries	14
Barber shops	60
Bars	10
Basins and sinks in dwellings.....	9,018
Basins and sinks in offices and stores.....	1,351
Baths in dwellings.....	10,835
Baths in hotels, etc.	197
Baths (shower)	27
Bidets	6
Bottling establishments	5
Building purposes	1,953

Carriages and wagons.....	214
Cellar drainers	6
Dwellings	9,110
Dwellings (half)	291
Drug stores	22
Dye houses	14
Factories	6
Ferrules (number)	7,844
Filters	4
Fire hydrants (use of)	83
Fish troughs and stands.....	12
Forges	2
Fountains (counter)	40
Fountains (garden)	5
Green houses	17
Heating boilers	233
Hydrants in new dwellings.....	9,110
Hydraulic elevators	8
Ice cream saloons.....	13
Lawn sprinklers	145
Laundries	10
Laboratories	3
Machines for scouring and rinsing.....	12
Milk houses	13
Motors (beer)	13
Motors (organ)	7
Photograph galleries	2
Pantry sinks	712
Pools (swimming)	3
Pools (in churches)	2
Restaurants and eating saloons.....	25
Slaughter houses	4
Stalls	475
Steam boilers (number)	395
Gas engines (number)	49
Tubs, vats and tanks.....	34
Urinals in dwellings.....	3
Urinals in stores, offices, etc.	175
Urinals, troughs	25
Wash paves and screw nozzles.....	2,541
Wash paves for watering horses.....	12
Wash tubs (stationary)	11,876
Water closets in dwellings.....	18,978
Water closets in stores, etc.	1,310

APPENDIX E

**REPORT OF SUPERINTENDENT
OF
BUREAU OF WATER CONSTRUCTION AND
REPAIR SHOP FOR 1911**

Philadelphia, January 17, 1912.

MR. FRED. C. DUNLAP,
Chief, Bureau of Water.

DEAR SIR:—I herewith submit the annual report of the operations at the Bureau of Water Construction and Repair Shop, Twelfth and Reed streets, for the year ending December 31, 1911.

Yours respectfully,
ARTHUR MOLYNEUX,
Superintendent of Shop.

MERCHANDISE AND WAGES.	Dr.
Inventory, January 1, 1911.....	\$39,245 59
Iron castings	\$19,830 28
Brass castings	4,914 56
Lead coating	465 71
Brass fittings	98 78
Wrought iron	1,094 89
Steel	827 09
Hardware	414 56
Bolts, nuts, washers and screws.....	675 07
Wrought iron pipe	67 79
Leather, gum goods and belting.....	1,299 18
Pig lead	1,792 49
Lumber	1,060 95
Coal	1,619 53
Coke	43 20
Oils and tallows	191 85
Paints and oils	228 00
Brushes and brooms	27 67
House cleaning supplies	48 95
Stationery and office supplies.....	2 66
Blanks and books	10 35
Forage	138 51
Harness and stable supplies.....	45 00
Miscellaneous	52 10
Wages	39,018 97
	73,968 14
Total	\$113,213 73

	Cr.
First District	\$6,745 43
Second District	3,601 90
Third District	7,163 12
Fourth District	4,299 81
Fifth District	1,459 37
Sixth District	7,436 13
Seventh District	9,841 81
	\$40,547 57
Belmont machinery	\$5,137 98
Belmonth boilers	989 07
Belmont filters	524 61
	6,651 66

Frankford machinery	\$2,109 07	
Frankford boilers	2,456 13	
		<u>\$4,565 20</u>
Queen Lane machinery	\$3,955 54	
Queen Lane boilers	673 54	
Queen Lane filters	198 01	
		<u>4,827 09</u>
Roxborough machinery	\$5,431 80	
Roxborough boilers	1,586 52	
Roxborough filters	249 21	
		<u>7,267 53</u>
Torresdale machinery	\$1,401 96	
Torresdale boilers	948 06	
Torresdale filters	73 20	
		<u>2,423 22</u>
Spring Garden machinery	\$288 37	
		<u>288 37</u>
General buildings and grounds	\$875 98	
		<u>875 98</u>
High pressure fire service	\$547 42	
		<u>547 42</u>
General distribution	\$190 95	
		<u>190 95</u>
Fixed patterns	\$541 88	
		<u>541 88</u>
Survey Bureau ..	59 14	
		<u>59 14</u>
Highway Bureau	\$134 37	
		<u>134 37</u>
Construction and repair shop.....	\$2,522 27	
		<u>2,522 27</u>
Main office	\$506 76	
		<u>506 76</u>
Holmesburg and Disston Water Co.	\$176 93	
		<u>176 93</u>
Total	\$72,126 34	
Inventory January 1, 1912.....	42,548 51	
		<u>\$114,674 85</u>
Total Cr	\$114,674 85	
Total Dr.	113,213 73	
		<u>\$1,461 12</u>
Balance	\$1,461 12	

INVENTORY, JANUARY 1, 1912.	CR.
33 4-in. stops at \$17.75	\$585 75
62 6-in. stops at \$21	1,302 00
40 8-in. stops at \$32.50	1,300 00
19 10-in. stops at \$42.75	812 25
14 12-in. stops at \$55	770 00
5 16-in. stops at \$95	475 00
2 20-in. stops at \$145	290 00
2 30-in. stops at \$330	660 00
1 10-in. special flanged stop at \$42.75.....	42 75
	<hr/> 6,237 75
Finished iron castings for stops.....	\$2,393 00
32,901 lbs. of iron castings for stops.....	1,398 29
Finished brass castings for stops.....	1,265 42
	<hr/> 5,056 71
59 No. 1 leather valve fire hydrants at \$40..	\$2,360 00
	<hr/> 2,360 00
Finished iron casting for fire hydrants....	997 35
38,578 lbs. iron castings for fire hydrants..	1,639 56
Finished brass castings for fire hydrants..	238 50
410 lbs. brass castings for fire hydrants...	75 85
Iron forgings for fire hydrants:.....	1,124 95
	<hr/> 4,076 21
360 4-in. rubber valves for fire hydrants...	\$234 00
3 6-in. rubber valves for fire hydrants...	3 75
370 lbs. rubber gaskets for fire hydrants..	111 00
139 partly finished leather valves for fire hydrants	243 70
	<hr/> 592 45
Chisels, etc., supplied to Districts and Stations	\$2,207 28
	<hr/> 2,207 28
688 brass ferrule plugs, various sizes...	\$250 80
500 wooden plugs, various sizes.....	250 00
Gaskets	143 02
	<hr/> 643 82
15,165 lbs. pig lead	\$909 90
	<hr/> 909 90
19,146 bolts, various sizes	\$1,036 16
2,317 set screws, various sizes	133 50
2,631 lbs. nuts, various sizes and kinds....	263 10
1,463 lbs. washers, various sizes	146 30
	<hr/> 1,579 06

2,968 lbs. iron—round, square and flat...	\$890 46	
780 lbs. Norway iron	31 20	
12,892 lbs. machinery steel—round, square and flat	386 76	
	<hr/>	\$1,308 42
1,454 stop screws and spindles, various sizes	\$4,147 05	
	<hr/>	4,147 05
408 sketch plates for fire hoes.....	99 72	
87 fire hoe heads	152 25	
	<hr/>	252 00
1 partly finished 48-in. rotary valve...	\$536 00	
13 48-in. quadrants	130 00	
15 30-in. quadrants	160 00	
3 turntables	262 50	
	<hr/>	1,088 50
2 34-in. plungers partly finished.....	\$500 00	
24 rough turned steel plunger rods....	1,323 30	
	<hr/>	1,823 30
188 air pump brasses, straps, keys and gibs	\$813 00	
	<hr/>	813 00
26,995 lbs. miscellaneous iron castings....	1,012 31	
9,828 lbs. pump machinery castings.....	417 50	
11,431 lbs. loam castings	571 55	
	<hr/>	2,001 36
5,639 lbs. red brass castings	\$1,043 22	
117 lbs. yellow brass castings	20 48	
11,833 lbs. Ajax metal castings	2,839 92	
	<hr/>	3,903 62
840 lbs. expansion metal	\$210 00	
1,750 lbs. rolled brass	437 50	
1,108 lbs. brass spring wire	277 00	
585 lbs. Babbitt metal	79 24	
	<hr/>	1,003 74
4,393 lbs. American cast steel	\$351 44	
2,701 lbs. Swedish cast steel	486 18	
616 lbs. shear steel	43 12	
300 lbs. Midvale steel	24 00	
811 lbs. spring steel	48 66	
245 lbs. Muschette steel	85 75	
439 lbs. "razor" steel	61 46	
2,928 lbs. Hex. steel	175 68	
	<hr/>	1,276 29

Hardware	\$518 25
Lumber	507 50
Leather belting	105 00
Paints and oils	47 26
Forage	16 04
Coal and coke	74 00
	<u>1,268 05</u>
Total	\$42,548 51

Furnished to Districts during 1911.

Districts.	No. 1 fire hydrants.	Wedge stops.						Plugs.		Iron bands.	Stop screws.	
		4-inch.	6-inch.	8-inch.	10-inch.	12-inch.	16-inch.	20-inch.	Wooden.			Brass.
First	38	1	58	25	11	21			56	295		11
Second	35	5	13	4	6		1		75	642		42
Third	57	12	101	39	2	3				410	6	48
Fourth	46	6	46	2	6	5				336		51
Fifth	10		17	17	1				12			
Sixth	76		91	44		8		1	6	144	12	27
Seventh	69	11	120	65	2	8	4		36	282		6
Totals	331	35	446	196	28	45	5	1	185	2,109	18	185

Stops and Fire Hydrants Built in 1911.

66 4-in. stops at \$17.75	\$1,171 50
443 6-in. stops at \$21	9,303 00
224 8-in. stops at \$32.50	7,280 00
24 10-in. stops at \$42.75	1,026 00
50 12-in. stops at \$55	2,750 00
6 16-in. stops at \$95	570 00
1 20-in. stop at \$145	145 00
362 No. 1 leather valve fire hydrants at \$40.00	14,480 00
Total	<u>\$36,725 50</u>

328 Fire Hydrants were repaired during 1911.

256 rubber valve to leather vale.

1 leather valve to rubber valve.

41 rubber valve to rubber valve.

30 leather valve to leather valve.

APPENDIX F

**REPORT
OF THE
CHIEF DRAUGHTSMAN
ON THE
HYDROGRAPHIC WORK
FOR THE YEAR 1911**

Philadelphia, January 20, 1912.

MR. FRED. C. DUNLAP,
Chief, Bureau of Water.

DEAR SIR:—The following report on hydrographic work under my charge, and on data collected during the year 1911, is respectfully submitted:

Rainfall observations at 20 stations from which the Bureau obtained these data have been carried on, completing 29 years of continuous records. Nine of these stations are maintained by the Bureau and furnished with instruments, stationery and postage. The observers are paid a small monthly salary for the services rendered.

Three of the stations are furnished with self-registering rain gauges, and at four stations automatic stream gauges are in operation. From the curves traced by these instruments the daily, monthly and yearly stream flow is computed.

The total observed precipitation for the year ending October 1, 1911, was slightly below the normal for the years during which these observations have been made.

The greatest monthly rainfall on the areas comprising the water sheds of the Schuylkill, Perkiomen, Neshaminy and Tohickon streams during the year was 9.98 inches, being the average of 17 stations for the month of August. More than three-fourths of this rainfall fell on the last five days of the month. This rainfall was particularly heavy along the coast, decreasing from the coast inland. The rain gauge at Fairmount recorded 10.40 inches from the twenty-fourth of August to the first of September, five days. In the same length of time the rain gauge at Seisholtzville, 45 miles inland from Philadelphia, recorded only 4.94 inches. The rainfall for the month recorded by the Water Bureau gauge was 12.56 inches.

The precipitation for February, which was not over two inches, was the smallest for the year. With the exception of the August storms, no very heavy rainfall, for short periods, occurred during the year.

Tables II, III and IV show the number of rainfalls and give the quantities exceeding .25 of an inch per hour at Philadelphia, Spring Mount on the Perkiomen and Forks of the Neshaminy, as recorded by the automatic gauges at these stations.

Stream flow observations with the automatic gauges have been continued on the Perkiomen, Neshaminy and Schuylkill, making 28 years of continuous records relative to stream flow on the three first named streams, and 13 years on the Schuylkill river. Observations on the Wisahickon were subject to so much interruption that a continuous record for over one year was impossible, so the work on this stream was discontinued in 1906.

The automatic gauge at Fairmount records the height

of water in Fairmount dam from zero, City datum, in feet and decimals of a foot, and records the height of water in inches on the dam above the old comb of the dam, which is given in the records of this Bureau as 4.76 C. D.

The zero of this gauge, as shown in the report for 1905, was compared with the City datum bench marks established by the Bureau of Surveys on both sides of the river, and was found to practically correspond with both.

Daily computations of the amount of water flowing over the flash boards were made from the records of the automatic gauge, the known pumpage from the river, the leakage and lockage (both estimated), which gives an approximation of the monthly flow of the Schuylkill river at Fairmount dam.

A comparison of the inches of rainfall flowing off in the Schuylkill river, with the runoff, in inches, on the Perkiomen and Neshaminy creeks, is shown in the following table:

Inches of Rainfall Flowing Off—January to December.

	Perkiomen	Neshaminy	Schuylkill
1898.....	21.50	22.22	24.39
1899.....	24.66	21.03	22.29
1900.....	15.21	17.27	18.23
1901.....	17.55	22.80	17.90
1902.....	29.01	30.74	29.02
1903.....	27.23	26.32	27.79
1904.....	23.07	23.37	19.84
1905.....	23.62	17.98	18.95
1906.....	21.67	24.41	17.31
1907.....	28.034	30.25	21.72
1908.....	18.708	20.807	17.096
1909.....	15.718	15.734	10.315
1910.....	16.923	18.666	12.262

At present there is no method available by which the low water for periods of less than one month can be determined.

The daily average flow of the Schuylkill river, as given in Table IX, is computed from the total monthly flow, and is often, for several days at a time, much less than shown in the table.

With the exception of one day in July and two days in August, water was flowing over the flash boards of Fairmount dam continuously from January 1st, which has not occurred before for many years, and was due to the completion of the filtration plant at Torresdale and the consequent partial abandonment of the river as a source of domestic supply and for power for pumping at Fairmount dam.

During the past three years there has been a marked decrease in the annual flow of all the streams, due, first, to a slight decrease in the annual rainfall, and, second, to the unequal distribution over the area comprising the watersheds of all the streams in the eastern part of the State.

An examination of Table I shows that the rainfall for February and March, months of least evaporation, was much below the monthly average for these months, consequently, there were no high stages or freshets in the rivers during these months.

The rainfall for April, July and August, months of the greatest evaporation, was much above the monthly average, and about 43 per cent. reached the streams. The highest stage of the streams and rivers occurred on August 31st.

These conditions combined to produce a low run off for the year, although the total rainfall is but little below the average for the past 29 years.

The average daily run off for the Schuylkill river for the past 13 years was 1,734,530,000 gallons, while the

daily average for 1911 was only 854,603,000 gallons, or about one-half the average for 13 years.

The average daily flow of the Perkiomen for 28 years was 162,431,000 gallons, and for 1911, 105,190,000, about 65 per cent. of the average for 28 years.

The average daily flow of the Neshaminy for 28 years was 148,830,000 gallons, and for 1911, 100,643,000 gallons, about 68 per cent. of the average for 28 years.

The average daily flow of the Tohickon for 28 years was 128,741,000 gallons, and for 1911, 82,649,000 gallons, or 63 per cent. of the average for that term of years.

The following-named tables, compiled as in previous years, accompany this report:

I. Monthly precipitation on sundry watersheds		
II. } III. } IV. }	Rainfalls exceeding $\frac{1}{4}$ inch per hour.---	{ Philadelphia. Forks of Neshaminy. Spring Mount.
V. } VI. } VII. }	Average rainfall flowing in..... Average annual yield of streams..... Comparative stream flow.	{ Perkiomen. Neshaminy. Tohickon. Schuylkill.
IX. Monthly and daily yield of.....		{ Perkiomen. Neshaminy. Tohickon. Schuylkill.

The Bureau is indebted to the following-named persons, who have kindly furnished rainfall records:

Mr. Thomas J. Beans, Moorestown, N. J.

Mr. Benjamin H. Shoemaker, Pennsylvania Hospital.

In order to secure uniformity in rainfall observations, the following notice was sent to the observers employed by the Bureau of Water at the beginning of the year 1890:

“To facilitate the work of the Hydrographic Corps, and maintain a uniform system of observations with the United States Weather Bureau, it is requested

that you hereafter take rainfall observations at least once every day, as near 8.00 P. M. as possible, recording the amount under that date as the rainfall for the preceding 24 hours."

Your attention is again respectfully directed to the value of this hydrographic work: first, in the length of time during which it has been continued, the year 1911 completing 29 years of records of rainfalls and 28 of stream flow observations; second, the very favorable conditions under which the observations have been continued for so long a period without any changes in the stream conditions at places selected for the location of the stream gauges, which would affect the original computed stream flow curves; third, in the fact that the watersheds adjoin each other, thus making it possible for the records of stream flows to be combined to cover one large area on which the observations have been consecutively made, as on small areas the rainfall is much more evenly distributed. The runoff from the small area is also, in all probability, more nearly correct, and shows clearly the amount of water taken from the rainfall by evaporation and vegetation on the surface of the ground at different seasons of the year.

Yours respectfully,
JOHN E. CODMAN,
In Charge of Hydrographic Work.

Philadelphia.

	Tohickon Series			Neshaminy Series		
	Ottisville	Smith's Corner	Point Pleasant	Lansdale	Forks of Neshaminy	Doylestown
	90	480	119	350	143	405
	Inches	Inches	Inches	Inches	Inches	Inches
Janu	3.17	3.57	3.50	3.17	3.15	4.31
Febr	2.13	2.05	2.45	2.36	1.92	2.46
Mar	3.15	3.33	3.13	2.90	2.34	3.32
April	3.43	4.05	3.93	3.87	3.90	4.31
May	2.66	2.57	2.55	2.39	2.50	1.98
June	4.39	4.17	3.15	4.27	4.21	4.11
July	6.62	5.90	4.45	2.64	2.14	3.59
Augu	7.16	8.79	9.63	11.23	10.82	14.00
Sept	3.06	2.51	2.60	2.95	2.27	3.04
Octo	5.63	5.98	5.71	4.77	4.73	6.47
Nov	4.55	4.72	4.61	4.14	5.67	3.57
Dec	3.75	3.70	3.71	3.46	3.70	4.37
T	9.70	51.34	49.42	48.05	47.30	55.53
P	97	99	96	94	92	106
	7.00	50.14	49.56	44.71	46.51	47.90
	112	118	114	107	111	118
Avera	2.70	1.20	0.86	3.34	0.79	7.63
Perce	6	2	-----	8	-----	13

TABLE II.

Rain Storms Exceeding in Rate 0.25 Inches per Hour as Recorded by the Automatic Rain Gauge at Philadelphia, for the Year 1911.

Date of observation	Automatic rain gauge					Remarks
	Total fall		Maximum fall			
	Amount in inches	Duration, hours, minutes	Amount in inches	Duration in minutes	Rate per hour during maximum fall	
March 15, rain storm.....	0.89	10—15	.25	60	.25	
April 20	1.82					
May 31, rain storm.....	.92	15—40	.42	45	.56	
June 6, shower.....	.43	40	.43	40	.65	
June 12, shower.....	.55		.40	25	.96	
June 20, shower.....	.55	0—20	.55	20	1.65	
June 23, shower.....	.30	1—00	.25	20	.75	
July 17, shower.....	2.35	3—50	2.25	60	2.25	
July 24, shower.....	.82	1—50	.30	10	1.80	
August 26, rain storm.....	1.16	25—30	.25	60	.25	
August 31, rain storm.....	5.96	Rain gauge	auge	flood ed.		
August 31, rain storm.....	6 P. M., 30,	to 7 P. M., 31,				5.84 ins. rainfall
September 11, shower.....	.45	2—30	.35	60	.35	
September 29, shower.....	.85	3—10	.25	15	1.00	
October 21, rainstorm.....	.62	23—00	.32	35	.55	
November 6, rain storm.....	1.62	8—55	1.37	112	.73	
November 28, rain storm.....	1.09	12—35	.59	60	.59	
December 31, rain storm.....	1.26	12—15	.50	15	2.00	

TABLE III.

Rain Storms Exceeding in Rate 0.25 Inches per Hour as Recorded by the Automatic Rain Gauge at Forks of Neshaminy, for the Year 1911.

Date of Observation	Automatic rain gauge					Remarks
	Total fall		Maximum fall			
	Amount in inches	Duration, hours, minutes.	Amount in inches	Duration in minutes	Rate per hour during maximum fall	
March 15, rain storm.....	1.01	11—40	.25	60	.25	
April 20, rain storm.....	2—10	18—25	.60	60	.60	
May 31, rain storm.....	2.42	17—10	.50	60	.50	
June 23, shower.....	.60	12—35	.40	25	.96	
July 17, shower.....	.95	3—55	.45	40	.68	
July 24, shower.....	.51	0—55	.51	50	.61	
July 24, shower.....	.46	4—35	.32	20	.96	
August 15, shower.....	2.10	7—45	.83	40	1.24	
August 15, shower.....			.47	30	.94	
August 15, shower.....			.55	20	1.65	
August 26, rain storm.....	2.48	26— 5	.74	35	1.27	
August 29-31, rain storm.....	5.05	55—10	.40	60	.40	
August 29-31, rain storm.....	5 A. M., 31,	to 3	P. M., 3.1		5 ins. rainfall.	
October 1, shower.....	1.30	10—50	.25	15	1.00	
November 6, rain storm.....	1.39	10—35	.54	60	.54	
December 15, rain storm.....	.85	9—30	.35	20	1.05	

TABLE IV.

Rain Storms Exceeding in Rate 0.25 Inches per Hour as Recorded by the Automatic Rain Gauge at Spring Mount, for the Year 1911.

Date of Observation	Automatic rain gauge					Remarks
	Total fall		Maximum fall			
	Amount in inches	Duration, hours, minutes.	Amount in inches	Duration in minutes	Rate per hour during maximum fall	
March 15, rain storm.....	1.08	14—45	.25	60	.25	
March 27, rain storm.....	.50	2—15	.35	15	1.40	
April 20, rain storm.....	1.26	18—45	.25	60	.25	
May 31, rain storm.....	2.30	17—50	.95	60	.95	
June 2, shower.....	.30	1—5	.25	28	.54	
June 6, shower.....	.70	-----	.20	15	.80	
June 12, shower.....	.78	8—20	.63	20	1.89	
June 13, shower.....	.85	1—5	.60	25	1.44	
July 14, shower.....	.83	11—15	.53	15	2.12	
July 17, shower.....	1.57	4—35	1.27	45	2.03	
July 24, shower.....	.31	2—10	.21	30	.60	
July 24, shower.....	.42	0—35	.35	15	1.40	
August 15, rain storm.....	.76	6—25	.46	45	.60	
August 18, shower.....	.60	—60	.55	20	1.65	
August 25, shower.....	.56	—40	.38	20	1.08	
August 31, rain storm.....	4.26	25—45	.40	60	.60	
August 31, rain storm.....	2 P.	M., 30,	to 8	P. M.	, 31,	3.44 ins. rainfall
September 11, shower.....	.74	4—40	.60	20	1.80	
September 29, shower.....	1.20	8—25	.40	60	.60	
October 1, shower.....	1.35	8—50	.55	35	.94	
November 18, rain storm.....						

TABLE V.

Inches of Rainfall Flowing in the Perkiomen, Neshaminy and Tohickon Creeks.

Watersheds.	Area in miles.	Percentage of total area.				Average for twenty-eight years—1883-1911.												S
		Woodland.	Cultivated.	Flats.	Roads.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
Perkiomen, at Frederick, 28 years.....	152.	25	71	2	2	2.86	3.47	3.72	2.15	1.34	0.94	1.03	0.96	0.97	1.06	1.76	2.26	
Neshaminy, below Forks, 28 years.....	139.3	6	92	¼	1¾	3.18	3.74	3.68	2.13	1.48	0.88	0.96	1.04	0.85	1.10	1.44	2.31	
Tohickon, 28 years.....	102.2	24	72	2	2	3.80	4.16	4.73	2.48	1.65	0.79	0.97	1.11	1.21	1.13	1.87	2.75	
Perkiomen, at Frederick.....	{	Maximum, 28 years.....				5.40	9.73	6.68	3.52	6.68	2.65	4.89	2.48	3.68	2.82	6.67	6.45	
		Minimum, 28 years.....				0.50	0.85	2.01	0.97	0.46	0.23	0.17	0.18	0.16	0.20	0.24	0.61	
Neshaminy, below Forks.....	{	Maximum, 28 years.....				6.77	10.44	7.11	4.20	7.41	2.93	5.47	3.37	3.81	4.55	6.31	5.55	
		Minimum, 28 years.....				1.60	0.90	1.84	1.03	0.35	0.08	0.04	0.14	0.03	0.06	0.11	0.41	
Tohickon.....	{	Maximum, 28 years.....				7.49	10.41	8.38	4.76	8.58	3.43	6.41	3.75	5.49	4.27	7.07	7.58	
		Minimum, 28 years.....				0.54	0.62	2.98	0.73	0.10	0.07	0.06	0.04	0.03	0.12	0.56	0.56	

TABLE VI.
Average Annual Yield of Sundry Watersheds to October 1st.

Watersheds.	Period covered in years.	Area in miles.	Average rainfall in inches.	Average rainfall flowing off in inches.	Per cent. flowing off.	Average daily yield in gallons.	Average yield in cubic feet per second per sq. mile of drainage area.	Average yield in cubic feet per second per sq. mile of drainage area for each inch of rainfall.
Perkiomen, at Frederick.....	28	152.0	46.210	22.444	48.570	162,431,000	1.6534	0.0358
Neshaminy, below Forks.....	28	139.3	47.640	22.445	47.113	148,830,000	1.6531	0.0347
Tohickon	28	102.2	48.001	26.457	55.120	128,741,000	1.9491	0.0406
Wissahickon								
Schuykill	13	1,915.0	46.730	19.023	40.708	1,734,530,000	1.4014	0.0300
Sudbury, Mass.	36	75.2						
Croton, N. Y.								

TABLE VII.
Comparative Daily Stream Flow.

Watersheds.	Area of watershed.	Maximum.	Gallons.	Date.	Minimum.	Gallons.	Date.
		Per day.	Per. sq. mile.		Per day.	Per. sq. mile.	
Perkiomen -----	152.0	1,380,400,000	9,080,000	August 31----	15,899,000	104,600	July 14.
Neshaminy -----	139.3	3,447,000,000	24,748,000	August 31----	5,429,000	38,970	July 12.
Tohickon -----	102.2	1,631,500,000	15,965,000	August 31----	2,649,800	25,930	August 1.
Wissahickon -----							
Schuylkill -----	1,915.0	15,019,100,000	7,842,000	September 1--	241,080,000	125,900	August 25.

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