ONE HUNDRED AND NINTH ANNUAL REPORT

OF THE

BUREAU OF WATER

FOR THE

YEAR ENDING DECEMBER 31, 1910

AND

ANNUAL REPORT

OF

GEORGE R. STEARNS

Director of the Department of Public Works

ISSUED BY THE CITY OF PHILADELPHIA, 1911

PHILADELPHIA
DUNLAP PRINTING CO., 1315-29 CHERRY STREET
1911

ONE HUNDRED AND NINTH ANNUAL REPORT

OF THE

BUREAU OF WATER

FOR THE

YEAR ENDING DECEMBER 31, 1910

AND

ANNUAL REPORT

OF

GEORGE R. STEARNS

Director of the Department of Public Works

ISSUED BY THE CITY OF PHILADELPHIA, 1911

PHILADELPHIA
DUNLAP PRINTING CO., 1315-29 CHERRY STREET
1911

ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC WORKS

FOR THE

YEAR ENDING DECEMBER 31, 1910

OFFICERS

OF THE

DEPARTMENT OF PUBLIC WORKS

DECEMBER 31, 1910

Director,
GEORGE R. STEARNS.

Assistant Director,
WILLIAM R. KNIGHT, JR.

Chief Clerk—Willis Sheble.
Clerk—Ernest T. Hanefeld.
Assistant Clerk—Andrew L. Teamer.
Stenographer and Clerk—Harry A. Stoy.
Stenographer and Typewriter—Joseph B. Smarr.
Special Inspector—Elvin S. Rodgers.
General Inspector—Robert C. Hicks.
Official Photographer—Lewis R. Snow.
Assistant Official Photographer—William Shane.
Chauffeur—John Hanahan.
Chauffeur—Thomas McKeever.
Office Boy—Archibald Frederick.
Messenger—J. Jarriatte Johnston.

CHIEFS OF BUREAUS.

Gas—Dr. N. Wiley Thomas.
Highways—Street Cleaning—William R. Benson.
Lighting—John J. Kirk.
Surveys—George S. Webster.
Water—Filtration—Fred. C. Dunlap.

Summary of Appropriations, Expenditures, Receipts, etc., of the Department of Public Works during the year 1910, and Totals for the years 1907, 1908 and 1909.

Bureaus.	Balance from previous years.	Annual appropriation for the year 1910.	Additional appropriations and transfers.	Transfers from	Net amount available, 1910.	Number of warrants drawn.	Amount of warrants drawn.				Balance available for 1911.	Amount merging.	Receipts.	Number of employees Dec. 31, 1910
							Salaries and wages.	Maintenance.	Improvements.	Total.				
Director's Office		$34,860 00	$3,750 00		$38,610 00	284	$31,460 00	$6,936 53		$38,396 50	$204 87	$8 54		15
Gas		10,000 00			10,000 00	101	9,500 00	500 00		10,000 06			$53 00	6
Highways—Street Cleaning	$1,999,765 45	2,645,334 00	853,865 47	$13,978 32	5,484,986 60	6,172	316,144 54	2,429,797 00	$674,949 26	3,420,890 80	2,052,206 14	11,889 66	75,718 61	394
Board of Highway Supervisors	*												11,171 09	12
Lighting		490,579 00	1,200 00		491,779 00	193	8,100 00	482,662 34		490,762 34	11 46	1,005 29		7
Surveys	4,916,912 52	316,180 00	187,324 83	612 56	5,419,804 79	3,441	295,187 10	45,768 94	1,896,546 26	2,237,502 40	3,174,652 41	7,649 98	39,146 87	313
District Surveyors	†												115,790 33	14
Water—Filtration	1,647,340 90	961,791 00	563,800 00	66,695 08	3,106,236 82	3,392	1,421,901 84	56,756 41	1,255,525 58	2,734,183 83	369,055 82	2,997 17	4,576,357 65	1,970
Total, 1910	$8,564,018 87	$4,458,744 00	$1,609,940 30	$81,285 96	$14,551,417 21	13,583	$2,082,293 58	$3,022,421 28	$3,827,021 10	$8,931,735 96	$5,596,130 70	$23,550 55	$4,818,237 55	2,731
Total, 1909	$9,700,831 92	$4,214,100 00	$6,023,572 62	$1,034,938 78	$18,903,565 76	13,518	$2,056,761 82	$3,601,227 11	$4,616,853 31	$10,274,842 04	$8,571,017 98	$57,705 74	$4,703,720 91	2,719
Total, 1908	$7,734,517 64	$4,446,763 25	$10,617,553 16	$239,728 09	$22,559,105 96	14,213	$2,061,133 57	$3,242,924 82	$7,538,325 06	$12,842,383 45	$9,700,831 92	$15,890 59	$4,509,158 00	2,657
Total, 1907	$8,511,764 80	$3,710,608 30	$8,499,119 69	$3,266,889 94	$17,454,602 85	14,835	$1,999,567 00	$2,657,376 55	$5,156,149 94	$9,813,093 49	$7,552,017 64	$69,141 84	$4,403,929 86	2,754

* Included in the appropriation and in the expenditures of Bureau of Highways.

† Included in the appropriation and in the expenditures of Bureau of Surveys.

NOTE.—The above statement does not include expenditures made by Department of Supplies for material and supplies for Department of Public Works.

TWENTY-FOURTH ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC WORKS

GEORGE R. STEARNS, Director

Philadelphia, January 3, 1911.

HON. JOHN E. REYBURN,
Mayor of Philadelphia.

DEAR SIR:—I beg to submit herewith report of the Department of Public Works for the year ending December 31, 1910—the Twenty-fourth Annual Report of the Department.

All details of operations, etc., will be found in the exhaustive reports of the Chiefs of the several Bureaus of the Department, which are attached hereto.

Appropriations.

The net amount of money available during the year was $14,551,417.21, of which $9,149,871.76 was derived from loans and $5,401,545.45 from direct taxation.

Expenditures.

The expenditures during the year amounted to $8,931,735.96, of which $5,104,714.86 was for maintenance and current expenses and $3,827,021.10 for extensions and improvements.

Receipts.

The total receipts were $4,818,237.55, an increase over 1909 of $114,516.64. I would call your attention to the fact that the receipts for the four years of this administration have been $18,435,046.32, which is an increase over the previous four years of $1,814,843.57.

Bureau of Gas.

The report of the Chief Inspector of Meters indicates that the officials of the Bureau of Gas still exercise close supervision over the quality of gas furnished by The United Gas Improvement Company.

Complaints.

The complaints against the service rendered by The United Gas Improvement Company, lessees of the Philadelphia Gas Works, have been so few they are scarcely worth noting.

Photometrical tests.

The daily photometrical tests of the gas furnished at the Gas Testing Stations show the following results:

Month.	Candle Power.
January	22.64
February	22.60
March	22.57
April	22.55
May	22.53
June	22.55
July	22.47
August	22.64
September	22.58
October	22.68
November	22.50
December	22.54
Maximum monthly average	22.78
Minimum monthly average	22.51

Chemical tests.

The following table gives the average monthly chemical composition of the gas furnished:

Carbon dioxide	3.76%
Illuminants	12.28
Oxygen	0.51
Carbon monoxide	25.56
Hydrogen	36.30
Methane	20.82
Nitrogen	0.77
	100.00%

Bureau of Lighting.

The total appropriation to the Bureau of Lighting during the year was $491,779.00, of which $490,762.24 was expended, $11.46 carried forward to 1911 and $1,005.20 merged into the City Treasury.

Lamps maintained.

The following table shows the total number of lamps maintained and under the supervision of the Bureau, together with statement of expenditures:

	1907.		1908.		1909.		1910.	
	Number of lamps.	Cost during the year.	Number of lamps.	Cost during the year.	Number of lamps.	Cost during the year.	Number of lamps.	Cost during the year.
Gas lamps maintained by the United Gas Improvement Co.	22,343	----------	22,913	----------	22,940	----------	23,240	----------
Gasoline lamps	14,432	$380,053 25	16,017	$420,806 81	16,017	$480,029 36	17,223	$478,954 26
Gas lamps supplied by the Northern Liberties Gas Co.	73	1,474 56	73	1,474 56	72	1,454 40	66	1,420 74
Gas lamps maintained by the Bureau of Correction	231	----------	231	----------	231	----------	231	----------
Salaries and office expenses	--------	10,267 38	--------	10,399 04	--------	10,367 13	--------	10,387 34
Totals	37,079	$391,795 19	39,234	$432,680 41	39,260	$491,850 89	40,760	$490,762 34

	1907.	1908.	1909.	1910.
Of the gas lamps maintained by the United Gas Improvement Co. there were not lighted, because of their proximity to electric lights	121	121	121	121
Of the gas lamps maintained by the Department of Charities and Correction there were not lighted, because of their proximity to electric lights	108	108	108	108
	229	229	229	229

Insufficient gas lamps.

It is to be deplored that Councils have not acted upon the recommendations of the Department that some method of relief be adopted whereby the Department would be enabled to furnish lamps on streets where new buildings are being erected, in addition to the 300 lamps per annum required by the terms of the lease of the Philadelphia Gas Works to be erected by the United Gas Improvement Company. The time is rapidly approaching when imperative action will have to be taken on this subject. As conditions are at present, we are constantly importuned by operative builders for more lamps, which we are unable to furnish with any degree of satisfaction to all concerned.

Incandescent gas lighting.

The recommendation of the Chief of the Bureau that the present open-flame gas lamps be replaced by the incandescent mantle has my hearty approval, and if his suggestion could be carried out it would, undoubtedly, result in Philadelphia being the best lighted city in the United States.

Gasoline lamps.

On November 2, 1910, bids were opened for furnishing and lighting naphtha lamps of sixty candle power for the year 1911, and the contract has again been awarded to the Welsbach Street Lighting Company of America—the only bidder—at its bid of $28 per lamp per year, and additional new posts at $7.50 per post, a reduction in price of $1 per lamp per year in comparison with the price paid in 1910, which will result in a saving of over $17,000 for 1911.

Bureau of Highways—Street Cleaning.

Expenditures and receipts.

The expenditures of this Bureau during 1910 aggregated $3,420,890.80, of which $2,745,941.54 were for current expenses and $674,949.26 were for extensions and improvements.

The receipts during the same period were $86,889.70, an increase over 1909 of $23,138.86.

Summary of work done.

Fourteen miles of streets were opened and graded during the year, and in connection with work done by builders at their own expense the total amount of grading amounted to 699,593 cubic yards. More than 25 miles of new streets were paved with asphalt, vitrified fire clay or shale blocks and granite blocks upon a six-inch cement concrete foundation, amounting to 297,823 square yards. The cost of this work approximately $480,000, of which $67,160.33 was paid by the City for paving intersections and in front of unassessable property, the balance being paid by the abutting property owners. Nearly three miles of old streets were repaved with granite blocks, asphalt, vitrified blocks or creosoted wood blocks, upon a six-inch cement concrete foundation, aggregating 69,062 square yards.

Repaving Market street.

The repaving of Market street, from Second street to the Schuylkill river, was completed, the portion done during the year being from Sixteenth street to the bridge over the Schuylkill river.

Maintenance of unpaved and macadamized streets.

The maintenance of unpaved and macadamized public highways during 1910 was conducted in a satisfactory manner, but the limited appropriation at our disposal prevented the doing of much absolutely needed work.

Various experiments have been made with dust-laying preparations with fairly satisfactory results, but the qualities of the preparations experimented with that have brought commendation from motor car owners have produced complaints from drivers of horses and *vice versa*. To avoid these conditions the Department contemplates still further experiments during the coming season.

Repairs to paved streets.

At the beginning of the year the appropriation for repairs to paved streets not occupied by passenger railway tracks was so small that the only work the Department could do was to patch up the most dangerous places, and not until July 29, 1910, did we receive sufficient funds

from Councils to enable us to proceed with this work in a systematic manner.

Railway streets. Bridge and sewer repairs.

The close of the year 1910 found the streets occupied by passenger railway tracks in good, travelable condition.

The value of your plan to have repairs to sewers and bridges of a minor character done by City employes has been amply demonstrated and much good work of a permanent character accomplished.

Northeast Boulevard and improvement of South Broad street.

After due advertisements contracts were entered into for continuing the work on the Northeast Boulevard, and improvement of South Broad street, and operations were vigorously prosecuted during the year.

Parkway.

Temporary improvements were made along the line of the Parkway during the year under review, and we anticipate that 1911 will see active and vigorous work progressing on what is destined to be Philadelphia's Champs-Elysees.

Street cleaning. Garbage.

The report of the Assistant Chief of the Bureau in charge of the Division of Street Cleaning gives an exhaustive resume of the work performed in the cleaning of streets, removal of snow, ashes and collection and disposal of garbage.

The following statement is a classification of the street pavements laid during the year, and their mileage; also, the total mileage of street pavements to December 31, 1910:

Kind of pavements.	Laid during 1910.		Making total in City, December 31, 1910.	
	Sq. yds.	Miles.	Sq. yds.	Miles.
Sheet asphalt	270,712	25.04	7,301,937	473.90
Asphalt block			139,589	15.
Granite block	15,170	.58	6,450,062	392.62
Cobble or rubble			264,949	25.81
Vitrified brick	41,573	2.20	2,630,032	168.11
Granolithic			72,726	12.77
Slag block			42,280	5.82
Macadam	112,291	8.70	3,259,705	303.73
Wood block	39,430	.68	94,430	2.22
Totals	497,176	37.20	20,255,710	1,399.98

Summary of Work Done in Improved Pavements—New Streets.

	1907.		1908.		1909.		1910.	
	Square yards.	Linear feet.	Square yards.	Linear feet.	Square yards.	Linear feet.	Square yards.	Linear feet.
Granite blocks	12,760	4,300	30,025	7,990	25,841	7,592	13,093	2,562
Asphalt	335,531	98,456	325,120	87,691	172,637	55,990	245,303	123,649
Vitrified bricks	50,943	15,260	70,667	23,578	67,999	21,034	39,427	10,405
Macadam	118,221	40,268	93,093	30,173	76,542	29,793	112,291	45,951
Totals	517,455	*158,284	518,905	†149,432	343,019	‡114,409	410,114	§182,567

*1907—Total amount of new pavements, 175,558 linear feet, equal to 33.25 miles.
†1908—Total amount of new pavements, 314,036 linear feet, equal to 59.47 miles.
‡1909—Total amount of new pavements, 176,578 linear feet, equal to 33.54 miles.
§1910—Total amount of new pavements, 196,434 linear feet, equal to 37.20 miles.

Replacing Cobble and Other Pavements With Improved Pavements—Old Streets.

	1907.		1908.		1909.		1910.	
	Square yards.	Linear feet.	Square yards.	Linear feet.	Square yards.	Linear feet.	Square yards.	Linear feet.
Granite blocks	41,107	15,702	64,525	18,896	12,929	2,871	2,077	486
Asphalt	3,484	1,272	381,845	124,193	62,710	38,044	25,409	8,573
Vitrified bricks	450	300	52,857	21,515	19,503	13,126	2,146	1,228
Wood blocks					55,000	8,128	39,430	3,580
Totals	45,041	*17,274	499,227	†164,604	150,142	‡62,169	69,062	§13,867

Statement of Work Done.

	1907.	1908.	1909.	1910.
New paving	118,016	119,259	84,616	136,616 linear ft.
Repaving with improved pavement	17,274	164,604	62,169	13,867 linear ft.
New macadamizing	40,268	30,173	29,793	45,951 linear ft.
Grading	1,062,949	1,177,236	539,343	699,593 cu. yds.
New footway paving	88,786	169,379	188,315	78,696 sq. yds.
Repairs to paved streets	311,009	325,924	494,205	471,705 sq. yds.
Footways repaved	22,636	49,627	34,101	19,827 sq. yds.
Crossing stone laid	6,239	15,966	18,674	3,203 linear ft.
Curbstone reset	79,863	210,165	86,747	29,377 linear ft.
Wooden trunks	9,148	8,702	6,551	1,590 linear ft.
Hand railings	4,958	9,638	4,339	414 linear ft.
Curved curb corners	8,114	15,377	10,207	6,784 linear ft.
New curbstone set	143,138	168,327	166,300	118,539 linear ft.
Vitrified brick and stone gutters	53,720	42,764	22,262	32,027 linear ft.
Resurfacing, sheet asphalt	56,599	13,581	38,845	272,678 sq. yds.
Resurfacing, broken stone	61,949	117,189	282,732	46,937 sq. yds.
Repairs to passenger railway streets	149,790	1,404,501	1,175,991	999,161 sq. yds.
Footways, curb, railroad notices served	22,235	37,210	24,494	17,091

Board of Highway Supervisors.

Expenditures and receipts.

The expenses of the Board of Highway Supervisors aggregated $11,259.73, and there was received and deposited with the Receiver of Taxes for the year 1910 the sum of $11,171.09.

Plans.

Our records were increased by the addition of fifty-nine plans of substructures, and we now have on file 2,123 plans covering 444 miles of streets.

The Chief Draughtsman and his assistants continue to perform the same high-class service as characterized their work of previous years.

Transactions of the Board of Highway Supervisors, 1907, 1908, 1909 and 1910.

	1907.	1908.	1909.	1910.
Pneumatic tubes	9	3	5	6
For vaults	10	3	3	10
For railroad tracks, curves and turnouts	41	29	38	40
For underground pipes	570	444	607	506
For electrical conduits	1,859	999	1,130	1,615
For drinking fountain	1	1	1	2
For bridges			2	11
For subway	15	8	1	
For tunnels			1	2
STATEMENT OF WORK DONE.				
New street record plans prepared	17	207	57	59
Blue print plans placed on file	185	246	261	387
RECEIPTS AND EXPENDITURES.				
Receipts	$20,741 14	$8,736 87	$8,350 25	$11,171 09
Expenditures	10,183 87	11,960 34	16,496 75	11,259 73
Deficit of receipts	*$10,557 27	$3,223 47	$3,146 50	$88 64

*Excess of receipts.

Bureau of Surveys.

The expenditures during the year were $2,237,502.40, of which $340,956.14 was for current expenses and $1,896,546.26 for extensions and improvements; the receipts during the same period were $154,937.20. Expenditures and receipts.

The construction of main sewers was proceeded with as far as the appropriations would permit. It is to be regretted that Councils have not seen fit to provide more liberally for work of this important character. It is a well-known fact that main sewers are the pioneers of interurban development, and the matter of appropriations for this purpose should be given paramount consideration by Councils and money provided without stint. Main sewers.

There were no funds provided during the year 1910 for the construction of branch sewers and inlets, and we were only enabled to carry on work from the small balances of loans brought forward from previous years. However, we were able to construct during the year 11,445 miles of branch sewers at a cost of $317,884.83. Branch sewers and inlets.

The sewer construction during 1910 amounted to 28,765 miles, divided as follows: Mileage of sewers.

Main sewers	2.997 miles
Branch sewers	11.445
Private sewers	11.660
Grade crossing sewers	.673
Boulevard sewers	.513
South Broad street improvement	1.091
Widening Delaware avenue at Vine and South streets	.234
Levick street sewer	.022
Miscellaneous	.130
	28.765 miles

The total length of all sewers constructed to December 31, 1910, is as follows:

Main sewers	185.64 miles
Branch sewers	866.06
Private sewers	153.48
Miscellaneous sewers	20.68
Total	1,225.86 miles

I would again call your attention to the imperative necessity of providing liberally for proper drainage facilities, and it is incomprehensible why Councils should fail to comply with the frequent requests made to them for appropriations for this purpose, especially in view of the fact that for every dollar expended the City receives ample return.

Sewer inspection.

This Department maintained the high standard adopted by this branch of the service in years past, and I have no hesitancy in stating that the rigid inspection to which all sewers and materials entering into their construction are subjected is not surpassed by any other city in this country.

Testing laboratory.

The work performed by the Testing Laboratory of the Bureau of Surveys has given it a national reputation, as is attested by the numerous requests from engineers and technical schools for reports of its operations. The money expended in its maintenance is a distinct saving to the City. The officials of this division are skilled engineers, and the equipment of the laboratory rivals that of any similar institution in the country.

Drainage, South Philadelphia.

This work was conducted to the full extent of the amount available for the purpose. A cursory examination of the report of the Chief Engineer would indicate that the work is extremely costly, but a study of the territory in process of development brings forcibly to mind the splendid investment the City is making in the way of deriving quick returns from increased taxation.

Steady progress has been made on this very important work. Our intercepting sewer systems have a decided bearing in preventing the pollution of our sources of water supply and are extremely essential to the welfare and health of not only those who dwell in our City itself, but to those who are dependent upon either the waters of the Delaware or Schuylkill rivers. Intercepting sewer systems.

After studies made at the Spring Garden Testing Station the Department was enabled to enter into contracts for the construction of sewage disposal plants for City institutions in the vicinity of Torresdale, including the County Prison, the House of Correction and the proposed Home for the Indigent. The land chosen for the disposal works had been acquired for the purposes of water filtration, but a tract of land not needed for future extensions has been utilized for a sewage disposal plant. Sewage disposal.

This is one of the most stupendous problems that confronts all large municipalities, and constant studies are being made in order that the plan adopted by the City of Philadelphia for approval of the State Department of Health may be founded upon the most substantial and scientific principles.

Much work has been accomplished in the construction of new bridges, and a number of sections of the City which had heretofore been inaccessible were brought in close contact with main arteries of travel. Bridges.

After years of agitation, the expenditure of huge sums of money and the solving of many difficult engineering problems, it is my extreme pleasure to state that at the time of writing this report all grade crossings on the Philadelphia, Germantown and Norristown Railroad, between Spring Garden Street and Wayne Junction, have been eliminated. How many lives were lost before this became an accomplished fact would be appalling were it known, Grade crossings.

and the citizens of Philadelphia are to be congratulated upon the rapid completion of this gigantic piece of work. This alone will be a monument to your administration.

Work is proceeding on the Richmond Branch of the Philadelphia and Reading Railway. Retaining walls and abutments are in process of construction, and as soon as the weather will permit the work of street grading, paving, repaving, etc., in connection with the above, will be proceeded with and pushed to completion as rapidly as the elevation of the tracks and construction of bridges over the intersecting streets will permit.

The completed work on Trenton avenue, along the line of the Philadelphia and Trenton Railroad, from Norris to Butler streets, has a total length of about 2.381 miles and has resulted in the elimination of thirty grade crossings in a thickly settled and busy portion of the City.

Future City improvements.

The studies in connection with the improvement of the City plans as outlined in 1907 are still being continued. Upon reading the report of the Chief Engineer of the Bureau of Surveys on this subject, some idea can be gleaned of the difficulty involved in preparing a comprehensive plan, and also an idea of the advantages to be derived if Philadelphia takes a broad view of the responsibilities of the future and places herself in a condition of preparedness for the contest for industrial, commercial and political supremacy of the coming years.

Passyunk bridge.

Work on the present contract for this bridge, which includes the superstructure and the grading and paving of the eastern approach, has made favorable progress, but, as noted in our last report, the bridge will not be available for public travel until Councils provide funds for grading the west approach on Passyunk avenue from the intersection of Sixty-third street. The bridge consists of twelve spans, with a length of 1,330 feet, having a driveway 38

feet wide and each sidewalk nine feet in width. The main span over the channel, which is a vertical opening draw or bascule of two leaves, operating on trunnion bearings 237 feet apart, gives a clear waterway between pier fenders of 200 feet. The draw is now in use and is being operated by electric power.

Chestnut street bridge.

The Department anticipates inviting proposals for the widening of Chestnut Street Bridge over the Schuylkill river early in the current year. Councils by ordinance of July 29, 1910, provided $90,000 to carry on this work, which sum it is believed will be sufficient to cover the cost of widening the bridge proper and the west approach thereto from Thirtieth street, but will not be enough to cover the widening of Chestnut street east of Twenty-fourth street.

Widening Delaware avenue

Favorable progress has been made in connection with the widening of Delaware avenue, from Vine to Green street, in the way of sewer construction and the purchase of property necessary to widen the avenue on the east side between Vine and Callowhill streets. There still being doubt as to the final location of the steam railroad tracks, any paving which has been done at this point is of a temporary character and a concrete base was not used under it.

District surveyors.

The Board held during the year twenty-two stated meetings for the transaction of general business and five special meetings for the purpose of disposing of urgent business or to visit localities where changes of City plan were under consideration.

The following is a summary of the receipts and expenditures of the District Surveyors during the year 1910:

Summary of Receipts and Expenses of District Surveyors for the Year 1910, and Totals for the Years 1907, 1908 and 1909.

Districts.	Surveyors	Cash receipts.	Credit for work done for the City.	Total credit.	Expenses.				Balance profit to the City.	Profit to the City in 1909.	Increase.	Decrease.
					Salaries.	Pay of Assistants.	Miscellaneous.	Total.				
1	John M. Nobre	$12,219 96	$12,234 40	$24,454 36	$4,000 00	$9,230 63	$1,459 29	$14,689 92	$9,764 44	$8,449 77	$1,314 67	
2	R. A. McFadden	2,657 72	12,026 97	14,684 69	4,000 00	7,890 97	1,256 28	13,147 25	1,537 44	2,033 32		$495 88
3	W. C. Cranmer	8,060 05	14,458 25	22,518 30	4,000 00	9,543 66	1,321 90	14,865 56	7,652 74	15,324 20		7,671 46
4	F. Bloch	2,535 86	9,138 56	11,674 42	4,000 00	6,006 04	1,125 16	11,131 20	543 22	1,971 58		1,428 36
5	Walter Brinton	19,001 47	13,091 21	32,092 68	4,000 00	12,554 19	1,944 67	18,493 86	13,598 82	16,195 56		2,601 74
6	Joseph Mercer	6,354 47	16,281 26	22,635 73	4,000 00	12,000 00	2,071 49	18,071 49	4,564 24	4,350 32	213 92	
7	W. K. Carlile	1,806 35	10,260 94	12,067 29	4,000 00	4,429 52	1,278 66	9,708 18	2,359 11	4,111 87		1,752 76
8	C. A. Sundstrom	3,490 12	16,550 12	20,040 24	4,000 00	12,480 00	2,081 56	18,561 56	1,478 68	581 25	897 43	
9	Joseph C. Wagner	12,851 48	13,922 79	26,774 27	4,000 00	11,828 34	2,477 67	18,306 01	8,468 26	8,585 03		116 77
10	John H. Webster, Jr.	8,736 47	14,666 63	23,403 10	4,000 00	11,569 95	1,483 66	17,053 61	6,349 49	12,012 21		5,662 72
11	Joseph Johnson	7,616 23	11,976 25	19,592 48	4,000 00	9,938 75	1,835 92	15,774 67	3,817 81	5,705 50		1,887 69
12	J. H. Gillingham	16,466 01	22,413 25	38,879 26	4,000 00	15,710 19	1,726 10	21,436 29	17,442 97	15,060 21	2,382 76	
13	H. M. Fuller	10,716 95	13,962 29	24,679 24	4,000 00	11,173 07	2,180 56	17,353 63	7,325 61	15,605 27		8,279 66
14	C. B. Webster	3,277 19	18,476 82	21,754 01	4,000 00	8,296 16	1,663 96	13,965 12	7,788 89	5,025 22	2,763 67	
	Total, 1910	$115,790 33	$199,459 74	$315,250 07	$56,000 00	$142,651 47	$23,911 88	$222,563 35	$92,686 72	$115,011 31	$7,572 45	$29,897 04
	Total, 1909	$146,862 21	$186,420 44	$333,282 65	$56,000 00	$139,718 63	$22,552 71	$218,271 34	$115,011 31	$119,643 51	$25,644 98	$30,277 18
	Total, 1908	$151,159 36	$181,938 71	$333,098 07	$56,000 00	$133,636 86	$23,817 70	$213,454 56	$119,643 51	$105,616 16	$21,633 91	$7,656 56
	Total, 1907	$129,570 08	$170,416 14	$299,986 22	$49,000 00	$123,539 90	$21,830 16	$194,370 06	$105 615 16	$98,397 37	$25,539 36	$18,320 57

Statement of Work upon Bridges.

	1907.	1908.	1909.	1910.
Finished	9	6	14	11
Begun	7	16	9	5
Authorized	5	1	8	2
Planned	10	15	14	14

Statement of Receipts.

Years.	Receipts of Bureau.	Receipts of District Surveyors.	Total.
1907	$38,839 99	$129,570 08	$168,410 07
1908	36,216 56	151,159 36	187,375 92
1909	44,137 42	146,862 21	190,999 63
1910	39,146 87	115,790 33	154,937 20

Statement of Expenditures.

	1907.	1908.	1909.	1910.
Current expenses	$280,926 62	$335,566 64	$328,868 39	$340,956 14
For extensions	1,807,557 64	2,549,109 81	2,359,397 36	1,896,546 26
Totals	$2,088,484 26	$2,884,676 45	$2,688,265 75	$2,237,502 40

Registry Division.

	1907.	1908.	1909.	1910.
Number of certificates of registered owners issued	5,010	4,502	4,935	4,900
Number issued for use of Law Department	463	299	418	384
Receipts from certificates of registered owners	$1,251 25	$1,130 50	$1,231 75	$1,221 00
Receipts from miscellaneous sources	$273 10	$252 50	$260 00	$160 50
Number of original lots plotted	11,520	9,760	11,799	6,191
Number of transfers registered	47,559	37,911	39,709	42,223
Number of plans made for use of City Departments, Bureaus, etc.	702	936	610	429
Number of examinations of registry plan books made by the public	71,056	72,426	72,692	73,974
Number of descriptions of property filed for registry	70,346	47,671	51,563	48,414
Number of titles perfected	2,715	2,496	2,240	2,117
Number of certificates of legal opening of streets issued to Bureaus, etc.	2,778	2,655	2,474	2,315
Number of certificates of registered owners in municipal lien cases for Law Department	686	860	865	560
Number of certificates of registered owners in municipal lien cases for Receiver of Taxes	343	665	317	80

Statement of Main, Branch and Private Sewers Built During the Years 1907, 1908, 1909 and 1910.

Classification.	1907.		1908.		1909.		1910.	
	No.	Linear feet.	No.	Linear feet.	No.	Linear feet.	No.	Linear feet.
Main sewers—intercepting	5	3,460	11	7,981	12	14,105	6	8,403
Main sewers—combined	19	11,119	25	21,714	15	12,423	10	7,419
Branch sewers	147	112,463	185	116,790	192	130,036	66	60,432
Private sewers	75	46,445	50	29,724	49	39,201	104	61,567
Boulevard sewers					1	1,501	1	2,709
Market street subway sewers	2	8,162	2	2,127				
Levick street improvement					1	871	1	117
Grade-crossing sewers	7	1,578	7	8,744	3	2,765	4	3,555
Widening of Delaware avenue							2	1,235
Miscellaneous							1	685
South Broad street—1904 to 1910 (inclusive)							1	5,760
Totals	255	*183,227	280	†187,080	273	‡200,902	196	§151,882

* Equal to 34,701 miles † Equal to 35,432 miles. ‡ Equal to 38,049 miles. § Equal to 28,766 miles.

Bureau of Water.

Expenditures. The total expenditures of the Bureau of Water during 1910 was $2,734,183.83, of which $1,478,658.25 was for current expenses and $1,255,525.58 for improvements and extensions.

Receipts. The receipts of the Bureau during the same period were $4,576,357.65, an increase over 1909 of $135,783.46. It is gratifying to note that the receipts of this Bureau show a substantial annual increase and are a tribute to excellent business methods which have been adopted and rigidly adhered to by the present Chief of the Bureau.

Water consumption. The consumption of water during the year was 114,730,900,447 gallons, an increase over 1909 of 3,034,723,538 gallons. The average daily consumption was 314,331,234 gallons and the per capita consumption per day averaged 203.2 gallons, an increase over 1909 of six gallons.

Queen Lane filters. It is to be regretted that operations on this very important piece of work were brought to a standstill on December 19, 1910, on account of lack of funds. This is particularly unfortunate, as the work is about 80 per cent. completed, and at the present writing we have no knowledge when operations will be resumed, as the additional appropriation for the completion of the filter plant is embodied in the $8,000,000 loan, which is the subject of litigation.

To obviate the furnishing of raw water to that section which is ultimately to receive its supply of filtered water from the Queen Lane Filters, the Bureau continued the treatment of water from the Queen Lane Reservoirs, which at times is very turbid and unpleasant to use, although reasonably safe, as there has been no increase in typhoid fever resulting therefrom.

The benefits derived from the use of filtered water, insofar as it applies to the much dreaded typhoid fever, is clearly demonstrated by the following figures compiled by the Chief of the Bureau of Water, which show a wonderful decrease as the various filter plants have been put into operation: Typhoid reduction.

Year.	Cases Typhoid Fever.	Deaths from Typhoid Fever.	Tyhoid Fever Death Rate Per 100,000 Population.
1901.....	3,669	444	33.7
1902.....	5,006	588	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

Of the cases and deaths which resulted from typhoid fever during 1910 fully one-half of the cases were contracted during the vacation period at nearby resorts. Of the total cases reported, 452 were directly traceable to outside causes.

As stated in my report for 1909, it is incumbent upon the authorities to either provide funds for the extension of our present system or adopt some method which will check the excessive waste of water. Careful studies indicate that if the present rate of increase in population continues—as is to be expected—it will require the expenditure of not less than $10,000,000 to provide a future supply of water in the same proportion as is now being furnished. Philadelphia is the only important city in the country that does not sell its water by measurement, and I firmly believe that the general adoption of meters is the only solution of the problem for checking waste. As condi- Future extensions.

tions now exist, the wasteful consumer is charged no more than possibly a half dozen careful, conservative users combined pay for their entire consumption.

Coal Consumption. The total coal consumption during the year was 210,263 tons at a cost of $618,381.25, a decrease over the amount used in 1909 of 4,693 tons and a decrease in cost of $11,523.86. Notwithstanding the lower coal consumption, there were pumped nearly 7,000,000,000 gallons more water than in 1909.

Pumping machinery and boilers. The high degree of efficiency to which the pumping machinery and boilers were brought in 1909 has been maintained, and our plants to-day are in first-class condition and a most valuable asset of the city.

Distribution. There were laid during the year 134,364 feet of new pipe, equal to 25.45 miles, making the total mileage of pipe now in use 1,637.60 miles. Of this amount 14.24 miles were laid during the year by private contract. Seven hundred and twenty-seven new fire hydrants were put in commission during the year, making the total number now in use 16,288. Of these 694 are on the High Pressure Fire Service, under the control of the Bureau of Fire. The total number of dwellings furnished with water is 315,326, an increase of 12,404 during the year.

General. I wish to testify to the high character of the services rendered by the Chief of the Bureau of Water and his able assistants, as it was only by the closest supervision and the exercise of greatest care that the present supply was maintained. A study of the detailed report of the Chief of the Bureau will present many valuable statistics on the advantages of municipal ownership.

Statement of Pumpage for the Years 1907, 1908, 1909 and 1910.

	1907 Gallons.	1908 Gallons.	1909 Gallons.	1910 Gallons.
Pumped to reservoirs	115,882,212,622	160,264,695,178	194,503,704,802	201,437,626,626
Equal to gallons pumped 100 feet high	242,285,589,403	278,534,592,507	313,903,826,387	321,996,695,118

NOTE.—The "pumped to reservoirs" includes 86,499,040,790 gallons repumpage to higher levels at George's Hill, Roxborough, Mt. Airy and Frankford High Service Stations, and also the low service filter beds at the Upper Roxborough and Torresdale filter plants, which, deducted from the total pumped, gives a total pumpage from the rivers of 114,938,385,836 gallons.

The quantity stored in reservoirs on December 31, 1910, was 207,685,389 gallons more than that stored on December 31, 1909. This quantity deducted from the total pumpage from the rivers makes the total consumption for 1910, 114,730,900,447 gallons.

The cost of pumpage is based on the total gallons pumped 100 feet high. The consumption per capita is computed from the average consumption during 1910 of 314,331,234 gallons per day.

	1907—Gallons.	1908—Gallons.	1909—Gallons.	1910—Gallons.
Pumped by water power	8,133,114,825	5,369,821,111	1,048,742,639	180,977,997
Pumped by steam power	108,749,097,797	154,894,874,067	193,454,962,163	201,256,648,629
Largest quantity pumped in twenty-four hours	368,585,438	508,764,869	625,958,908	605,067,632
Smallest quantity pumped in twenty-four hours	199,486,931	329,016,621	287,203,410	480,598,278

	1907.	1908.	1909.	1910.
Average daily consumption	302,436,641	322,043,989	306,016,923	314,331,234
Average consumption per capita per day	201.7	210.2	197.2	203.2
Cost of one million gallons pumped 100 feet high	$5.63	$5.58	$4.43	$4.31
Estimated population	1,449,747	1,531,752	1,552,000	1,549,000

*United States census.

The decreased cost of pumpage per million gallons pumped 100 feet high is 12 cents less than that of the preceding year.

Statement of Receipts and Expenditures for the Years 1907, 1908, 1909 and 1910.

	Receipts 1907.	Receipts 1908.	Receipts 1909.	Receipts 1910.
Receipts from water rents	$3,710,187 53	$3,873,179 02	$4,049,443 80	$4,219,553 73
Receipts from fractional rent	92,649 45	95,556 28	161,933 09	147,105 33
Receipts from water pipes	107,071 85	127,955 41	104,046 54	50,555 51
Receipts from City Solicitor's office	39,176 74	37,848 32	34,865 02	32,331 26
Receipts from penalties	30,160 89	34,999 93	36,015 25	38,668 10
Receipts from delinquent rent	28,721 55	36,036 92	37,876 96	39,024 02
Receipts, miscellaneous	3,917 72	19,628 81	8,296 40	40,739 55
Receipts from searches	3,096 00	2,573 75	2,523 50	2,557 50
Receipts from delinquent penalties	4,938 13	5,267 05	5,573 63	5,822 65
Totals	$4,020,819 36	$4,233,045 49	$4,440,574 19	$4,576,351 65

	Expenditures 1907.	Expenditures 1908.	Expenditures 1909.	Expend'ures 1910.
Current expenses	$1,358,934 15	$1,555,855 81	$1,604,340 27	$1,478,658 25
For extensions	938,672 29	2,605,235 59	1,222,859 63	1,255,525 58
Totals	$2,297,606 44	$4,161,091 40	$2,827,199 90	$2,734,183 83

Statement of the Number and Type of Engines and Their Several Aggregate Capacities, at the Various Stations.

Pumping stations.	Designated number of engine or turbine.	Type of engine.	Designed capacity in million gallons per day.	Totals.
*Spring Garden Old Station	5	Compound Rotary	20,000,000	
Old Station	6	Simpson Compound Rotary	10,000,000	
Old Station	7	Marine Compound Rotary	20,000,000	
Old Station	8	Worthington Duplex	10,000,000	
New Station	9	Worthington Duplex	15,000,000	
New Station	10	Worthington Duplex	15,000,000	
New Station	2	Holly	30,000,000	
New Station	3	Holly	30,000,000	150,000,000
Queen Lane	1	Southwark	20,000,000	
Queen Lane	2	Southwark	20,000,000	
Queen Lane	3	Southwark	20,000,000	
Queen Lane	4	Southwark	20,000,000	80,000,000
Belmont	1	Bethlehem Cross Compound	10,000,000	
Belmont	2	Bethlehem Cross Compound	10,000,000	
Belmont	4	Worthington Duplex	17,000,000	
Belmont	5	Holly Horizontal Compound	10,000,000	
Belmont	6	Holly Horizontal Compound	10,000,000	
Belmont	7	Holly Horizontal Compound	10,000,000	67,000,000

*Shut down February 18, 1909, and supply obtained from Lardner's Point.

Statement of the Number and Type of Engines and Their Several Aggregate Capacities—Continued.

Pumping stations.	Designated number of engine or turbine.	Type of engine.	Designed capacity in million gallons per day.	Totals.
Belmont High Service	1	Allis Chalmers Company	6,000,000	
Belmont High Service	2	Worthington	5,000,000	11,000,000
Roxborough, Old House	1	Gaskill	10,000,000	
Roxborough, Old House	2	Worthington Duplex	5,000,000	
Roxborough, Old House	3	Worthington Duplex	6,500,000	
Roxborough, New House	4	Worthington Horizontal Compound	5,000,000	
Roxborough, New House	5	Worthington Horizontal Compound	5,000,000	
Roxborough, New House	6	Worthington Horizontal Compound	5,000,000	
Roxborough, New House	7	Worthington Horizontal Compound	5,000,000	
Roxborough, New House	8	Worthington Horizontal Compound	5,000,000	
Roxborough, New House	9	Worthington Horizontal Compound	5,000,000	51,500,000
Roxborough High Service	1	Worthington	5,000,000	
Roxborough High Service	2	Worthington	5,000,000	
Roxborough Low Service	3	Worthington Centrifugal	10,000,000	
Roxborough Low Service	4	Worthington Centrifugal	10,000,000	
Roxborough Low Service	5	Worthington Centrifugal	10,000,000	40,000,000
Mt. Airy	1	Davidson	1,000,000	
Mt. Airy	2	Davidson	1,000,000	
Mt. Airy	3	Knowles	1,000,000	3,000,000

Statement of the Number and Type of Engines and Their Several Aggregate Capacities—Continued.

Pumping stations.	Designated number of engine or turbine.	Type of engine.	Designed capacity in million gallons per day.	Totals.
Frankford	1	Marine Compound Rotary	10,000,000	
Frankford	2	Corliss Compound Rotary	10,000,000	
Frankford	3	Southwark Rotary	22,000,000	
Frankford	4	Southwark Foundry Quarter Crank Flywheel	15,000,000	
Frankford	5	Holly Vertical Triple Expansion	20,000,000	
Frankford	6	Holly Vertical Triple Expansion	20,000,000	
Frankford	7	Holly Vertical Triple Expansion	20,000,000	
Frankford	8	Holly Vertical Triple Expansion	20,000,000	
Frankford	9	Holly Vertical Triple Expansion	20,000,000	
Frankford	10	Holly Vertical Triple Expansion	20,000,000	
Frankford	11	Holly Vertical Triple Expansion	20,000,000	
Frankford	12	Holly Vertical Triple Expansion	20,000,000	
Frankford	13	Holly Vertical Triple Expansion	20,000,000	
Frankford	16	Holly Vertical Triple Expansion	20,000,000	257,000,000
Frankford High Service	1	Holly Horizontal Compound	3,000,000	
Frankford High Service	2	D'Auria Compound Duplex	4,000,000	7,000,000

Statement of the Number and Type of Engines and Their Several Aggregate Capacities—Continued.

Pumping stations.	Designated number of engine or turbine.	Type of engine.	Designed capacity in million gallons per day.	Totals.
*Fairmount—New House	1	Turbine Wheels	2,000,000	
*Fairmount—New House	3	Turbine Wheels	5,330,000	
*Fairmount—New House	4	Turbine Wheels	5,330,000	
*Fairmount—New House	5	Turbine Wheels	5,330,000	
*Fairmount—Old House	7	Turbine Wheels	5,100,000	
*Fairmount—Old House	8	Turbine Wheels	5,100,000	
*Fairmount—Old House	9	Turbine Wheels	5,100,000	33,290,000
Torresdale	1	R. D. Wood Centrifugal	40,000,000	
Torresdale	2	R. D. Wood Centrifugal	40,000,000	
Torresdale	3	Allis Chalmers Company Centrifugal	40,000,000	
Torresdale	4	R. D. Wood Centrifugal	40,000,000	
Torresdale	5	R. D. Wood Centrifugal	40,000,000	
Torresdale	6	R. D. Wood Centrifugal	40,000,000	
Torresdale	7	R. D. Wood Centrifugal	40,000,000	
Torresdale	8	Allis Chalmers Company Centrifugal	40,000,000	320,000,000
Totals				1,019,790,000

*Shut down February 18, 1909, and supply obtained from Lardner's Point.

Statement of the Location, Date of Completion, Elevation, and Capacity of the City's Reservoirs.

Name of reservoir.	Location.	Date of completion.	Height above City datum.	Capacity in gallons.
Fairmount—Reservoir No. 1	East Fairmount Park	1815	94 feet	26,261,000
Fairmount—Reservoir No. 2		1821		
Fairmount—Reservoir No. 3		1827		
Fairmount—Reservoir No. 4, Section 1		1835		
Fairmount—Reservoir No. 4, Section 2		1836		
Fairmount—Reservoir No. 4, Section 3		1836		
Spring Garden	Twenty-sixth and Master streets	1844	120 "	12,950,000
Corinthian	Corinthian avenue and Poplar street	1852	120 "	37,341,000
East Park—Section 1	East Fairmount Park	1887	133 "	62,738,000
East Park—Section 2		1888		306,400,000
East Park—Section 3		1889		319,480,000
Queen Lane—South Basin	Thirty-third street and Queen Lane	1894	238 "	177,480,000
Frankford	Oxford turnpike and Comly street	1877	167 "	36,946,000
Belmont	West Fairmount Park	1870	212 "	40,000,000
Belmont	Belmont and City avenues	1903	279 "	72,000,000
Belmont Clear Water Basin	Monument avenue and Ford road	1903	239 "	16,500,000
Mount Airy	Allen's lane and Mower street, Germantown	1851	363 "	4,546,000
Roxborough	Ridge and Shawmont avenues	1866	366 "	12,838,000
Roxborough Clear Water Basin	Dearnley and Fowler streets	1903	325.75"	3,000,000
New Roxborough—North Basin	Port Royal avenue and Ann street	1893	414 "	71,594,000
New Roxborough—South Basin				75,438,000
New Roxborough Clear Water	Port Royal avenue and Hagy street	1903	410 "	8,000,000
Belmont Stand Pipe	West Fairmount Park	1895	364 "	106,000
Roxborough Stand Pipe	Port Royal avenue and Ann street	1895	491 "	106,000
Frankford Stand Pipe	Oxford turnpike and Comly street	1900	300 "	106,000
Oak Lane	Fifth and Medary avenue	1904	210 "	70,000,000
Torresdale Clear Water Basin	State road and Pennypack street	1905	7 "	50,000,000
Totals				1,403,830,000

Statement Relating to Pipe Laying and Fire Hydrants Placed.

Year.	PIPE LAID.			*Pipe relaid.	Fire hydrants placed in position.			Substituted for defective hydrants.			Fire hydrants in use.	New water attachments.
	Feet.	Equal to—			New Style.	Old Style.	Total.	New Style	Old Style.	Total.		
		Miles.	Feet.	Feet.								
1907	151,900	28	4,060	†5,910	308	----------	308	316	----------	316	14,852	9,167
1908	149,187	28	1,347	‡22,214	407	----------	407	493	----------	493	15,168	7,757
1909	135,392	25	3,392	°11,170	448	----------	448	567	----------	567	15,561	8,139
1910	134,364	25	2,364	§4,630	775	----------	775	407	----------	407	16,288	9,887

Total pipe laid, 1,637.60 miles.

* Adds nothing to feet in ground.

‡ Pipe taken up exceeds quantity relaid 1,648 feet.

† Pipe taken up exceeds quantity relaid 720 feet.

° Pipe taken up exceeds quantity relaid 1,787 feet.

§ Pipe taken up exceeds quantity relaid 2,878 feet.

Director's Office.

The work of this office increases from year to year, and the employes are on duty constantly in order to successfully cope with the same.

Official photographer.

The services of the Official Photographer become more valuable each year and are requisitioned by nearly every branch of the City Government. The creation of this office has amply demonstrated its economy, as a substantial saving is made each year.

In concluding this report I wish to express my sincere appreciation of your advice and assistance and to offer my thanks to the Chiefs and employes of the several Bureaus comprising this Department for their loyal support.

Respectfully submitted,

GEORGE R. STEARNS,

Director.

ANNUAL REPORT

OF THE

BUREAU OF WATER

FOR THE

YEAR ENDING DECEMBER 31, 1910

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. VAN LOAN.

Registrar,
JAMES F. McCRUDDEN.

Chief Clerk,
J. T. HICKMAN.

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

Chief Draughtsman,
JOHN E. CODMAN.

Assistant Engineers,
JOHN S. ELY, T. NELSON SPENCER.

Mechanical Engineers,
CHAS. B. BUERGER, FRANCIS HEAD.

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

Superintendents of Filters,

JOS. S. V. SIDDONS,
Torresdale.

ALFRED STEAD,
Belmont.

ALBERT TOLSON,
Roxborough.

Search Clerk—John S. Todd.

Pipe Inspector—Max M. Segl.

Messenger—Haines Lewis.

Superintendent of Shop—James H. Dean.

Chief Inspector—Edward Harshaw.

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 St. 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.
Paymaster—A. I. Flomerfelt.
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.
General Storekeeper—Theo. Homan.
Foreman Laborer—Wm. Calhoun.
Lineman—Edward J. Cavanaugh.

ANNUAL REPORT

OF THE

BUREAU OF WATER

FOR THE YEAR 1910

TWENTY-FOURTH ANNUAL REPORT

OF THE

BUREAU OF WATER

ONE HUNDRED AND NINTH ANNUAL REPORT

OF

OPERATIONS CONNECTED WITH THE CITY WATER SUPPLY

Philadelphia, January 1, 1911.

MR. GEORGE R. STEARNS,

Director, Department of Public Works.

SIR:—I respectfully submit the following report of the work performed by the Bureau of Water during the year ending December 31, 1910:

The past year has again demonstrated the efficiency of the filters. The Bureau has at all times supplied an effluent, not only acceptable to the eye, but also safe to drink, and it was our misfortune that owing to the large territory supplied we were not in all cases able to give all our citizens clean water at a good pressure.

The raw water district outlined in last year's report was continued, and the people living therein were supplied with treated water from the Queen Lane reservoirs, which at times was very turbid and consequently unpleasant to use, although it is reasonably safe, and the records show no increase in typhoid fever in this section.

The Queen Lane filters have been in course of construction for the entire year, and are about 80 per cent. completed. Work on these filters was stopped on December 19, 1910, on account of lack of funds, and it is not known when it will be resumed. This is particularly unfortunate, as at the time filtered water was introduced into the center of the City the district supplied from the Oak Lane reservoir was made as large as possible, and owing to increase in consumption, and the necessity of extending still further the territory to include a portion of the section supplied direct from Lardner's Point on account of lack of pressure in this latter district, the service now rendered those in the Queen Lane district is poor, and will not be improved until the Queen Lane filters are placed in service, as fully half of the present Oak Lane section will then be supplied from Queen Lane.

There are other complications entering into the distribution system which result in the reversal of flow in some of the mains at certain hours, and this often gives a slightly turbid appearance to water which when it left the filters was as clear as crystal.

There is nothing that affects the health and welfare of the people more than their water supply, and if the funds to complete the filters are to be longer in litigation, I would most earnestly recommend that Councils be petitioned to provide funds from the current revenue for the finishing of this work.

The cost of operating the Bureau during the past year

was $2,360,865.00, which includes material furnished by the Supply Department, and represents all the expenses that can be charged to maintenance. This is a decrease of $206,438.42 over the operating expenses of 1909.

Your attention is also called to an increase of $133,920.97 in the receipts of the Bureau over those of 1909, the total receipts being $4,586,884.65. Also, the revenues for this year are $566,065.29 larger than those received in 1907, which increase has been secured by ordinary business methods, and not by an increase in the schedule rates.

The difference between the receipts and the operating expenses is $2,226,019.65, leaving a balance of over $350,000.00 after interest and sinking fund charges on the Filtration and Improvement Loans are paid.

The Bureau is supplying water to 456 premises that the Water Committee of Councils has designated as charitable institutions and subject to a discount of 85 per cent. in their water bills. The total fixture charge on these properties at the schedule rating would amount to $109,908.33, for which the City receives only $16,386.14. This, together with the water furnished without charge to City buildings, and that used for fire extinguishing purposes, represents considerable service for which the Bureau naturally cannot charge, but which is for the benefit of the community, and should be taken into account if a profit and loss balance is made.

The total quantity of water filtered during the year was 98,503,370,000 gallons, an increase of 2,420,000,000 gallons over that of 1909. The total cost, exclusive of pumping, was $210,723.62, or $2.14 per million gallons filtered, of which $0.226 is for laboratory work. The above amount includes $34,550.53 for operating the preliminary filters at Lower Roxborough, Belmont and

Torresdale; the cost for preliminary treatment of 93,435,000,000 gallons of water at these three stations averaged $0.37 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 $402,270.92, or $4.08 per million gallons filtered, the cost of pumpage at the Torresdale Station being $2.17 per million gallons filtered.

The above noted costs are practically the same as for the previous year.

The Ashbridge Commission, consisting of Messrs. Hering, Wilson and Gray, in reporting upon the extension and improvement of the water supply in September, 1899, stated in their estimates of cost that the "cost of filtration per million gallons of filtered water, including labor, cost of wash and waste water, lost sand, sanitary analysis of water chemicals, superintendence, watchmen, ordinary repairs, and all incident expenses, but excluding interest, depreciation and cost of pumping water to filters," would be as follows:

Slow Sand Filers

Schuylkill River plants.....	$3 60 per million gallons
Delaware River—Torresdale.....	3 00 per million gallons

It is interesting to note that the actual cost on the above outlined basis for the filters for the past year was as follows:

Schuylkill River plants.....	$3 21 per million gallons
Delaware River—Torresdale.....	1 82 per million gallons

Also, their estimate of the cost of pumping water to the filters at Torresdale is almost exactly the same as the actual amount expended for this work last year.

Typhoid Fever

The following table shows the number of cases of typhoid fever and deaths in Philadelphia during the past ten years. It is most gratifying to notice the very marked decrease in this disease, due to the completion of the various filter plants and the introduction of filtered water.

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	588	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

Of the cases and deaths reported for 1910, 134 cases were contracted during the vacation period at our nearby ocean resorts; 60 were secondary cases or those contracted directly from the patient, and 258 others, or a total of 452 cases, were directly traceable to outside causes.

The daily average consumption for the year was 314,331,000 gallons, and this represents, when the day pumpage is taken into account, the limit of the Bureau, not only in pumps and filters, but in pipes as well.

It is only by the exercise of the utmost care that the present supply is maintained, and while the pressure is good in many parts of the City, it is not so in the lower and western center of the City.

It is possible with the expenditure of not less than ten million dollars to enlarge the Torresdale Filters and Pumping Station, also the Lardner's Point Pumping Station, as well as the mains conveying water from Lardner's Point to South Philadelphia. Funds, however, are not available, and even if they were the time required to build these additional works would be so long that it will not be possible, at the present rate of consumption, to provide for the natural growth of the City. Philadelphia to-day is the only important City that has forbidden the selling of water by measurement, and we still charge the man who wastes more water than a dozen others will use the same price that we do the careful and conservative citizen, who takes enough interest in life to have his plumbing repaired, or his spigots turned off when not in use.

Our filter plants, pumping stations and distribution system are ample to give a much better service than we are now providing, to a population 50 per cent. larger than we have at present, if meters were installed on the establishments of large consumers and those whom we know to be wasting water.

Such a course will not at first increase the revenue, but it will decrease our operating expenses, and make it possible to give everyone a good supply of clear water and at a good pressure.

We have hundreds of cases where the water charges provided by the Schedule of Rates and our regulations work a decided hardship to the consumer, and result in the small manufacturer paying more water rent proportionately than the large one.

The Bureau has had introduced in Councils the following ordinance to remedy the defects noted above, but without result, and I respectfully recommend that Councils be again petitioned to allow the Bureau to place meters under these or similar conditions:

"AN ORDINANCE

"Authorizing the Department of Public Works (Bureau of Water) to place meters on certain premises using City water, and charge meter rates for water used on such premises, and repealing all ordinances inconsistent herewith.

"SECTION 1. *The Select and Common Councils of the City of Philadelphia do ordain,* That the Department of Public Works (Bureau of Water) is hereby authorized and empowered to place meters on all premises where City water is consumed when formally requested by the owner or owners thereof, or upon any premises except private dwellings where, in the judgment of the Chief of the Bureau of Water, there is an excessive use of water.

"SECT. 2. Charges shall be made for all water metered at the rate provided by Ordinance approved July 27, 1901.

"SECT. 3. All meters installed by authority of the Department of Public Works (Bureau of Water) and not requested by the owner or owners of the premises, shall be placed at the expense of and remain the property of the City. No rental shall be charged the consumer for the use of the meter, but the consumer shall be held responsible for the safe keeping of the meter or meters, and shall pay for any damage thereto other than from ordinary wear and tear, or from injury by fire.

"SECT. 4. All meters installed by the Department of Public Works (Bureau of Water), at the request of the owner or owners of the premises upon which said meters are installed shall be paid for by the owner or owners of said premises. No meter or meters shall be removed unless approved by the Chief of the Bureau of Water. The City reserves the right at any time, or at all times, to remove any meter or meters for testing purposes.

"SECT. 5. All ordinances or so much of ordinances inconsistent herewith be and the same are hereby repealed."

The water rent and inspection division of the Bureau has been placed in charge of a registrar, and the organization is in excellent condition, and compares favorably with that found in the largest business establishments. The volume of business done is large, and it has been so systematized that it is mutually beneficial to the City and the water consumers.

Consumption.

The consumption of water during 1910 was 114,730,900,447 gallons, an increase of 3,034,723,538 over that of 1909. The average daily consumption was 314,331,234 gallons, an increase of 8,300,000 gallons per day. The per capita rate was 203.2 gallons.

The average daily pumpage of the Bureau was 551,800,000 gallons, divided as follows:

	Gals. per day.
Pumpage into distribution	314,800,000
High service pumpage	8,000,000
Low service pumpage	229,000,000

The increase of pumpage over the amount consumed is due to the low lift or double pumpage at the Torresdale and Upper Roxborough filters and by the High Service Pumping Station.

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

	Gallons.
Lardner's Point	206,100,000
Belmont	42,700,000
Queen Lane	38,700,000
Roxborough	27,000,000
Total	314,500,000

Of the above quantity, 65 per cent. was pumped from the Delaware river, and 35 per cent. from the Schuylkill river, and 88 per cent. of the total supply was filtered.

The total quantity of water filtered during the year was 98,503,400,000 gallons, divided as follows:

	Gallons.
Torresdale	75,910,490,000
Belmont	14,107,971,000
Upper Roxborough	5,067,849,000
Lower Roxborough	3,417,040,000
Total	98,503,350,000

Revenue Collected.

The revenue collected from all sources amounted to $4,586,884.65, exceeding that of the preceding year by $133,920.97.

The total collections during 1910, and the amounts for the several items, as compared with those of the preceding year, were as follows:

	1909	1910	Increase	Decrease
Water rents	$3,829,119 06	$3,972,300 56	$143,181 50	
Meter rents	396,016 79	416,279 42	20,262 63	
Frontage	104,046 54	50,555 51		$53,491 03
Collected by City Solicitor	36,099 64	32,866 81		3,052 83
Penalties	41,588 88	44,490 75	2,901 87	
New connections	24,118 00	17,103 10		7,014 90
Searches	2,523 50	2,557 50	34 00	
Miscellaneous	7,061 78	40,099 97	33,038 19	
Old material, Department of Supplies	4,215 49	884 03		3,331,46
Ferrules, Highway Bureau	8,174 00	9,567 00	1,393 00	
Totals	$4,452,963 68	$4,586,884 65	$200,811 19	$66,890 22
			66,890 22	
Net increased collections, 1910			$133,920 97	

Statement of Appropriation and Expenditures for the Year 1910.

Annual appropriation for maintenance	$961,791 00
Additional appropriation for maintenance	339,500 00
Balance from 1909, for maintenance	1,389 53
Appropriation from loans for maintenance	223,500 00
Appropriation for refund	800 00
Balance from previous years—loan	1,645,951 37
Total	$3,172,931 90

Expenditures for Maintenance.

From annual and additional appropriations	$1,231,654 48
From loans	246,203 77
Total	$1,477,858 25
For refund	$800 00
Transferred	66,695 08
Merging	2,997 17
Not merging	369,055 82

Loan Funds.

Balance from previous years	$1,647,340 90
Additional appropriations	223,444 27
Total	$1,870,785 17

Expenditures from Loans.

For improvement, extension and filtration	$1,244,060 74
For extension of fire main	11,464 84
For maintenance	246,203 77
Set aside to meet contracts	323,824 13
Balance available	45,231 69
Total	$1,870,785 17
Warrants drawn for maintenance	$1,477,858 25
Warrants drawn for improvements	1,255,525 58
Warrants drawn for refund	800 00
Total	$2,734,183 83

Number of warrants drawn for maintenance	2,584
Number of warrants drawn from loans	808
Number of employees, December 31, 1910	1,970

Expenditures.

Maintenance:

Salary and pumping station pay rolls	$486,933 65
Buildings, grounds and reservoirs pay rolls	334,538 99
District and improvement pay rolls	333,858 57
Bureau shop rolls	36,700 11
Hydrographic corps	1,596 00
Filtration pay rolls	238,170 65
Supplies from direct appropriations	46,060 28
Total	$1,477,858 25
Materials furnished by Department of Supplies	883,006 75
Total cost of maintenance	$2,360,865 00

Improvements:

Total expenditures on account of improvement and filtration contracts	$1,255,525 58
Total expenditures	$3,616,390 58

Total Expenditures.

Total expenditures for maintenance and construction, including amounts expended for improvements and the extension and filtration of the water supply, from 1799 to December 31, 1910.	$94,247,395 85

Total Earnings of the Bureau of Water.

Total revenue from water rents, etc., from the installation of the water works in 1799 to December 31, 1910	$112,546,950 28

Net Profit Earned by the Bureau of Water.

Net profit earned by the Bureau of Water from the installation of the works in 1799 to December 31, 1910	$18,299,554 43

This does not include cost of collection, 1887 to 1910.

Bonds for the Improvement, Extension and Filtration of the Philadelphia Water Supply, January, 1911.

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	3,000,000 at 3 9,000,000 at 3½
June 11, 1902	5,000,000		1,300,000	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
June 30, 1908	10,000,000		800,000	
July 19, 1909	3,539,700		725,000	
		$4,465,000	$27,525,000	
			4,465,000	
Total for water and filtration			$31,990,000	

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, $28,025,000.

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	$22,276,849 83
Paid on uncompleted contracts	1,408,384 05
Limits of uncompleted contracts, less payments	263,115 95
Land damages	876,435 55
Expenses, supplies, advertisements, etc	435,729 16

Inspections	$24,514 94
Salaries and wages	1,571,639 60
Expended by Water Bureau	1,013,149 89
Damages to property on account of pipe laying	18,876 55
Repaving over pipe trenches	100,053 99
Available balances on hand	36,250 49
Total	$28,025,000 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	$78,768.66
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 and filter plants during the year was 210,263 tons, costing $618,381.35, a decrease over the amount used in 1909 of 4,693 tons, and a decrease in cost of coal used of $11,523.86.

With this lower coal consumption there were pumped 6,934,000,000 gallons more water than during 1909.

The regular pumping stations used a total of 173,863

tons, 4,087 tons less than in 1909, and pumped 114,939,000,000 gallons, an excess of 3,830,000,000 gallons over 1909.

The High Service Stations burned 4,705 tons of coal during the year, an excess of 163 tons over that of 1909, and pumped 300,000,000 gallons less water. This lower pumpage was due to the abandonment of the Mt. Airy Pumping Station, and a change in the district supplied from the Frankford High Service Station.

The Low Service Stations pumped 83,600,000,000 gallons, 3,426,000,000 gallons more than in 1909, and burned 30,439 tons of coal, 1,872 tons less than in the preceding year.

The increase and decrease in the consumption of coal, and the corresponding increase or decrease of pumpage at the several pumping stations as compared with the preceding year, was as follows:

STATIONS	Coal—Tons.		Pumpage—M. Gals.	
	Increase.	Decrease.	Increase.	Decrease.
Fairmount				876
Spring Garden		7,036		3,456
Belmont	1,768		1,336	
Queen Lane	3,998		3,679	
Shawmont		4,914		222
Lardner's Point	2,097		3,340	
Total	7,863	11,950	8,355	4,555

STATIONS	Coal—Tons		Pumpage—M. Gals.	
	Increase	Decrease	Increase	Decrease
High Service Stations				
George's Hill	524		94	
Roxborough		84		280
Mt. Airy		302		65
Chestnut Hill		22		
Wentz Farm	47			50
Totals	571	408	94	395
Low Service Stations				
Roxborough	670		86	
Torresdale		2,542	3,340	
Totals	670	2,542	3,426	
Grand total	3,104	14,990	11,905	4,950

Analyses of samples of coal shipped to the principal pumping stations were made throughout the year, and the following tables show the average results of the several tests made at each station:

STATIONS	Volatile Comb.	Fixed Carbon	Ash	Sulphur	B. T. U.	No. of Tests
	BITUMINOUS COAL (DRY).					
Shawmont	21.56	66.91	11.34	2.42	13834	42
Lardner's Point	19.77	68.69	11.53	2.50	13839	132
Torresdale	20.39	69.26	10.37	1.99	13928	65
Average	20.57	68.29	11.08	2.30	13867	
	PEA COAL (DRY).					
Belmont	6.99	76.87	16.13	0.84	12263	39
Queen Lane	6.57	76.67	16.75	0.88	12264	33
Shawmont	5.68	79.33	15.01	0.79	12647	29
Average	6.41	77.62	15.96	0.84	12391	

Pumping Stations.

Lardner's Point.

The cost of operating the Lardner's Point Pumping Station, including all labor, coal, supplies and repairs, was $444,460.55, divided as follows:

House No. 1	$33,544 75
House No. 2	218,461 73
House No. 3	192,454 07

The cost of pumping a million gallons of water 100 feet high in House No. 2 was $2.99, proportioned as follows:

Labor, $1.49; coal, $1.31; oil, packing and supplies, $0.19.

The same service cost in House No. 3, $2.45 per million gallons 100 feet high, divided as follows: Labor, $0.98; coal, $1.05; oil, packing and supplies, $0.16.

The difference in cost is represented largely by most of the auxiliaries being in House No. 2 and more of the administrative expenses are charged to it.

The six engines in House No. 2, and the three in House No. 3, operate with an average lift of 206 feet, while the other three engines in House No. 3 work under a lift of 250 feet.

The total pumpage at the station for the year was 75,229,360,000 gallons, divided as follows:

	Gallons.
House No. 1	582,000,000
House No. 2	35,524,300,000
House No. 3	39,123,000,000

The increase in total pumpage for 1910 over that of 1909 was 3,340,000,000 gallons.

The average daily pumpage was 206,100,000 gallons.

The quantity of coal consumed was 73,202 tons, costing $192,713.98, an increase of 2,097 tons over that used in 1909, which was due to the increased amount of water pumped and to coal lost by two fires in the bunkers.

The station is in excellent condition, and it is a sight that cannot be seen in any other pumping station in the world when the twelve 20-million gallon Holly vertical engines are all at work at one time, and it is our misfortune that that is often necessary.

The six 20-million gallon Holly vertical, triple-expansion engines in House No. 3 were tested in the latter part of 1909 and the first half of this year, and the duty obtained, per 1,000 pounds of steam, was as follows:

	Per cent.
Engine No. 11—173,695,000 ft. lbs., exceeds guarantee....	10
Engine No. 12—175,054,000 ft. lbs., exceeds guarantee....	1.8
Engine No. 13—178,138,000 ft. lbs., exceeds guarantee....	14.9
Engine No. 14—181,211,000 ft. lbs., exceeds guarantee....	16.9
Engine No. 15—177,200,500 ft. lbs., exceeds guarantee....	14.3
Engine No. 16—173,222,000 ft. lbs., exceeds guarantee....	11.8

The above engines have been in constant service and are giving perfect satisfaction.

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 $165,-109.63, or $2.10 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 $5.01, divided as follows: Labor $2.52; coal, $2.07; oil, packing and sundries, $0.42. The average lift was 42 feet.

The above 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 78,529,360,000 gallons, an increase of 3,340,000,000 gallons over that of 1909, and, owing to the very excellent manner in which the station was operated, at a lower coal consumption than for the previous year.

The average daily pumpage was 215,000,000 gallons.

The six R. D. Wood & Co.'s centrifugal pumps and engines are still in the hands of the contractor and are being operated under his direction.

The 50-million gallon DeLaval turbine driven centrifugal pump, on a daily test gave a duty of 104,000,000 foot pounds per 1,000 pounds of steam, and the unit is in regular operation.

The total quantity of coal used was 25,590 tons, and cost $68,217.06, a decrease in the amount of coal consumed over that of 1909 of 2,542 tons.

Fairmount and Spring Garden.

Both the Fairmount and Spring Garden Stations have been out of service during the past year, and are in the hands of caretakers, awaiting such disposition as may be made of them in the future.

Belmont.

The total pumpage at the Belmont Station was 15,581,123,852 gallons by meter measurement, an increase of 1,336,341,304 gallons, or over 4 per cent. more than that pumped during the preceding year.

The average daily pumpage was 42,688,010 gallons, an increase of 3,661,208 gallons per day.

The total cost of operating the station, including all labor, supplies and repairs, was $250,315.06 for the year.

There were used 39,842 tons of coal, costing $126,697.56.

The average lift was 298.7 feet, and the total cost of operating the station was $5.39 per million gallons 100 feet high, divided as follows: Labor, $2.15; coal, $2.74; oil, packing and sundries, $0.50.

The consumption of coal increased 1,768 tons, but notwithstanding this fact there was a decrease of 4.5 per cent. in the coal consumed per unit of work performed.

Nos. 5 and 7 engines have undergone extensive repairs and have been equipped with new pump chambers, made in accordance with plans designed in this Bureau. These chambers show no signs of stress, strains or working, and in these respects are a very great improvement on the original design.

No. 6 pump is receiving similar attention, with the exception that only two chambers are defective and are to be replaced with new ones. The repairs to this engine are about 45 per cent. completed.

The two 10-million gallon horizontal cross-compound pumps, erected by the Bethlehem Steel Company, were tested on March 18th and a duty was obtained of 136,657,500 foot pounds for No. 1 engine, and 135,395,000 foot pounds for No. 2 engine per 1,000 pounds of dry steam, exceeding their guaranteed duty by 3.53 and 2.57 per cent.,

respectively. These engines have been in constant service all year and are giving satisfaction.

Queen Lane.

The total cost of operating this station, including all labor, coal, supplies and repairs (including the re-building of engines Nos. 1, 2 and 3), was $169,277.62 for the year 1910, representing $4.69 for each million gallons raised 100 feet high, divided as follows: Labor, $2.03; coal, $2.33; oil, packing and sundries, $0.33.

The average lift was 255.9 feet.

The total pumpage was 14,105,922,500 gallons by meter measurement, an increase of 3,679,377,500 gallons, or 26 per cent. over 1909.

The average daily pumpage was 38,700,000 gallons.

The quantity of coal consumed was 25,098 tons, costing $84,078.30, an increase of 4,000 tons over that of 1909. Due to the increased pumpage, there is, as a matter of fact, however, an increasd efficiency shown of 12 per cent. due to the improvement effected in engines Nos. 1 and 2, and the better operation of the station.

The work of rebuilding engine No. 1 in accordance with plans made in this Bureau was completed and the engine put into service August 11th. This engine has since been in continuous operation, and engine No. 2, which was similarly reconstructed during 1909, has likewise been in service throughout the year. Both these pumps work satisfactorily and are greatly improved.

The rebuilding of engine No. 3 in a similar manner is in progress, and the work thereon about 65 per cent. completed.

The average "slip" on the engines at this station, as determined by the plunger displacement and by meter measurement, was 3 per cent. as compared with 4.72 per cent. in 1909.

Shawmont.

The total cost of operating the Shawmont Pumping Station for the year 1910, including all labor, coal, supplies and repairs, was $212,883.10, or at the rate of $5.44 per million gallons pumped 100 feet high, divided as follows: Labor, $2.39; coal, $2.57; oil, packing and sundries, $0.50.

The average lift was 397.4 feet.

The total pumpage by meter measurement was 9,841,201,837 gallons, a decrease of 222,959,081 gallons, due to the increased efficiency of the pumps and to meter measurements, more than to any reduction in consumption.

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

The quantity of coal consumed was 13,380 tons of pea coal and 20,088 tons of bituminous coal, costing $99,903.75, a decrease of 4,914 in tons, and $14,692.86 in value over that used in 1909.

No. 5 engine was thoroughly overhauled and is in good condition.

No. 6 engine is undergoing similar repairs and is about 75 per cent. completed.

Nos. 8 and 9 engines, horizontal, cross-compound, 5,000,000 gallon capacity, built by The Snow Steam Pump Works, were tested on March 26th and a duty obtained of 141,446,000 foot pounds for No. 8 and 144,240,000 foot pounds for No. 9, per 1,000 pounds of dry steam, exceeding the guaranteed duty by 4.77 and 6.84 per cent., respectively.

High Service Stations.

The total pumpage at the High Service Stations was 2,901,832,140 gallons, a decrease of 300,468,802 gallons.

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

Stations.	Pumpage Gallons.	Increase Gallons.	Decrease Gallons.
Belmont	984,015,220	94,569,280	
Roxborough	1,504,157,400		279,967,500
Mt. Airy	3,412,500		65,355,987
Frankford	410,247,020		49,714,595
Totals	2,901,832,140	94,569,280	395,038 082
			94,569,280
Decrease			300,463,802

Mt. Airy Pumping Station was shut down June 9, 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.

The work in connection with the installation of these boilers and the building of the extension to the boiler house was done by employees of the Bureau, and it is now about 90 per cent. completed.

Roxborough Low Service Station.

The total pumpage at this station was 5,067,849,000 gallons, an increase of 85,698,000 gallons.

Pumpage and Itemized Cost for 1910.

Stations	Pumpage.	Average Lift.	Labor.		Coal.		Oil, Grease and Waste.		Packing, Rubber, Valves, Etc.		Sundries.		Total Cost of Station.	Cost per M. G. 100 ft. High.	Averages, 1909.
			Cost.	Per M. G. 100 ft. High.	Cost.	Per M. G. 100 ft. High.	Cost.	Per M. G. 100 ft. High.	Cost.	Per M. G. 100 ft. High.	Cost.	Per M. G. 100 ft. High.			
‡Fairmount	180,977,997	92.15	$11,163 38	$66 85	----------	-------	$18 83	11	$9 45	06	$694 86	4 16	$11,886 52	$71 18	$12 99
‡Spring Garden	----------	------	20,435 22	------	$7,164 54	-------	62 32	------	108 48	------	1,327 61	------	29,102 17	--------	14 33
Belmont	*15,581,123,852	298.34	99,843 50	2.15	126,697 56	2 74	2,660 25	04	7,373 37	16	13,740 38	30	250,315 06	5 39	5 64
Queen Lane	*14,105,922,500	255.97	73,284 24	2 03	84,078 30	2 33	2,518 73	07	2,872 90	08	6,523 45	18	169,277 62	4 69	5 50
Shawmont	*9,841,201,837	397.41	93,276 47	2 39	99,903 75	2 57	2,108 40	05	5,617 88	14	11,976 60	31	212,883 10	5 44	5 89
Lardner's Point No. 1	581,995,790	189.82	27,342 49	24 73	4,251 52	3 86	131 68	12	596 64	54	1,222 42	1 11	33,544 75	30 36	9 94
Lardner's Point No. 2	35,524,347,120	206.00	109,161 07	1 49	95,686 49	1 31	2,749 98	04	2,866 53	04	7,997 66	11	218,461 73	2 99	2 80
Lardner's Point No. 3	39,123,016,740	225.12	85,936 23	98	92,775 97	1 05	3,093 96	04	1,996 60	02	8,651 31	10	192,454 07	2 19	2 06
George's Hill	984,015,220	135.99	14,504 66	10 85	6,527 61	4 87	421 51	31	235 35	18	933 33	70	22,622 49	16 91	17 69
Roxborough H. S.	1,504,157,400	117.53	21,166 18	12 01	6,489 70	3 69	133 39	08	227 84	13	4,871 10	2 76	32,888 21	18 67	12 08
Mt. Airy	3,412,500	101.42	4,599 17	153305	507 86	169 29	748	2 49	2 25	75	82 57	27 53	5,199 33	1733 11	124 90
Chestnut Hill	----------	------	1,433 68	------	130 68	-------	7 97	------	----------	------	16 37	------	1,588 70	--------	------
Wentz Farm	410,247,020	140.59	11,395 97	19 75	3,606 20	6 25	219 39	38	80 77	14	717 00	1 24	16,019 33	27 76	27 12
Roxborough L. S.	5,067,849,000	21.85	7,684 40	6 90	17,698 85	15 97	471 72	43	78 52	07	504 18	46	26,437 67	23 86	17 46
Torresdale	†78,529,359,650	42.00	83,063 17	2 52	68,217 06	2 07	1,844 53	06	1,083 13	03	10,901 74	33	165,109 63	5 01	4 77
Totals and averages	201,437,626,626	159.81	$664,293 83	$2 06	$613,736 09	1 91	$16,450 17	05	$23,149 71	07	$70,160 58	22	$1,387,790 38	4 31	4 43

*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 9.45 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 5,067,849,000 gallons of water, an average of 13,884,000 gallons per day, corresponding to an average rate of 2.479 million gallons per acre per day.

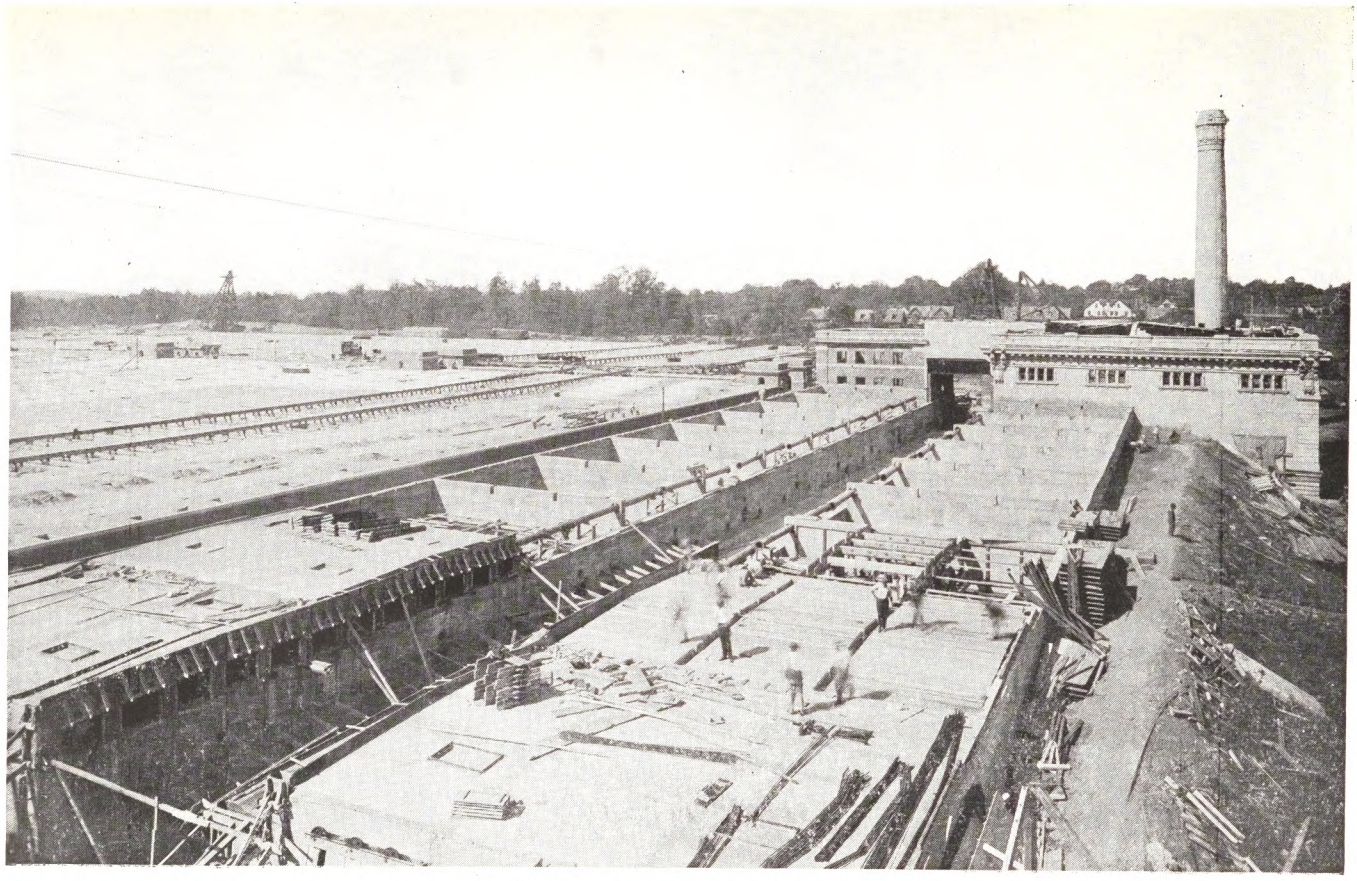
The total cost of operation was $15,656.96, or $3.09 per million gallons, of which the laboratory cost was 47 cents per million gallons filtered. This includes all the items connected with the operation of the station, but does not include the cost of pumping water from the storage reservoir or sedimentation 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	99.83
Average reduction, bacteria	99.30
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.86
Minimum reduction, turbidity	97.83
Minimum reduction, bacteria	89.09

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

	Per cent.
Average reduction, turbidity	99.93
Average reduction, bacteria	99.91
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.99
Minimum reduction, turbidity	94.44
Minimum reduction, bacteria	99.58



View of Queen Lane Filters.

The total number of runs or cleanings during the year was 62, an average of 7.75 runs to each filter, the average time between scrapings being 43.44 days. The average amount filtered between cleanings was 80.63 million gallons or, 115.183 million gallons per acre.

Three methods of washing were used during 1909 and their average runs were as follows:

Scraping and ejecting, 1909, 16 runs.....average 43.7 days each
Brooklyn method, 1909, 18 runs.....average 55.4 days each
Nichols separators, 1909, 31 runs.....average 41.6 days each

and the cost of labor and wash water was respectively 49 cents, 28 cents and 61 cents per million gallons of water filtered, or an average price of 48 cents.

The average amounts filtered between runs for the three above methods of washing were 90.2, 85.7 and 74.9 million gallons, and the wash water required was 2,200, 1,300 and 1,200 gallons per million gallons of water filtered, respectively.

This 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 9.45 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 37, while the effluent from the reservoir averaged 14.

The percentage of reduction in turbidity was 61.2 per cent., and the reduction in bacteria from the above storage was 87.54 per cent. The maximum turbidity of the raw Schuylkill river water at the Roxborough station was 950, the minimum 5, and the average for the year 37.

The average bacteria in the Schuylkill river at Shawmont location of the pumping station supplying water to this plant was 77,800, the minimum 3,900, and the maximum 460,000.

Lower Roxborough Filters.

This station consists of a storage reservoir of 12,838,000 gallons capacity, giving a period of 1.59 days' sedimentation; five covered filter beds, having a combined area of 2.65 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 3,417,040,000 gallons of water, or a daily average of 9,362,000 gallons, corresponding to an average rate of 3.533 million gallons per acre per day. The filters were operated at rates between five and six million gallons per acre per twenty-fours hours.

The total cost of operation, including the preliminary filters but not including the cost of the wash water, was $16,478.73, or $4.82 per million gallons filtered, of which the laboratory cost was 69.6 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 $1.23 per million gallons of water filterd by the sand filters. The cost of labor and wash water was 68 cents,

replacing slag and furnishing new sponge cost 37 cents per million gallons. The average turbidity of the applied water for the year was 24, and the effluent averaged 12, the average reduction in turbidity being 51.4 per cent. The removal of bacteria by the preliminary filters for the year averaged 41 per cent.

The maximum quantity filtered by the sand filters in one day was 11,831,000 gallons, equivalent to a rate of 5.58 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 washings of the sand filters for the year was 65, an average of 13 per filter. The average time between scrapings was 25.19 days, and the average amount filtered between cleanings was 51.75 million gallons, equivalent to 97.65 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	99.42
Average reduction, bacteria	98.80
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.93
Minimum reduction, turbidity	96.43
Minimum reduction, bacteria	95.78

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 1.59 days), preliminary filters and the final filters:

	Per cent.
Average reduction, turbidity	99.81
Average reduction, bacteria	99.58
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	100.00
Minimum reduction, turbidity	98.00
Minimum reduction, bacteria	98.00

Belmont Filters.

The Belmont Filter Station is composed of a sedimentation basin of 70,000,000 gallons capacity, giving a period of 1.8 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 combined area of 13.23 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 14,107,971,000 gallons, at an average yield of 38,652,000 gallons per day, corresponding to an average rate of 2.857 million gallons per acre per 24 hours.

The maximum amount of water filtered in any one day was 43,815,000 gallons, equivalent to a rate of 3.24 million gallons per acre per day of filters in service.

The preliminary filters were started on October 23, 1907. They were 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 $40,393.73, or $2.86 per million gallons filtered, which included a charge of $7,464.58 for operation of the preliminary filters and $3,336.99 for laboratory expenses, the cost of preliminary filtration being 53 cents per million gallons and the laboratory charge 24 cents per million gallons.

The reduction in turbidity and bacteria by the action of the preliminary filters was 50.14 per cent. and 44.5 per cent., respectively.

There were one hundred and fifty-six runs or cleanings during the year; one hundred and thirty-nine of these runs were on filters cleaned by the Brooklyn method and seventeen by the other methods.

The average length of runs was 40.58 days, the amount filtered between runs being 89,130,000 gallons, or 118,522,000 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.

Sixteen 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	139
Average length of runs, days	41.1
Average m. g. filtered per run	91.25
Average m. g. filtered per acre per run	121.34
Average cost of water to wash per m. g. filtered	$0.05
Average cost of labor to wash and spade per m. g. filtered	0.44
Total cost of washing and spading sand in place (water and labor) per m. g. filtered	0.49
Average gallons water used to wash sand in place per m. g. filtered	3,480

One filter was cleaned by raking, spading and ejecting to the court in the usual manner for the entire year. The items of cost, etc., were as follows:

Number of runs	9
Average length of runs, days	39.05
Average m. g. filtered per run	87.63
Average m. g. filtered per acre per run	116.53

Average cubic yards sand scraped per m. g. filtered....	1.05
Average cost to scrape per m. g. filtered.....	$0.50
Average cost to remove per m. g. filtered.....	0.16
Average cost to wash per m. g. filtered.....	0.05
Average cost to scrape, remove and wash per m. g. filtered	0.71
Average cost to clean, including replacing sand, per m. g. filtered	0.99

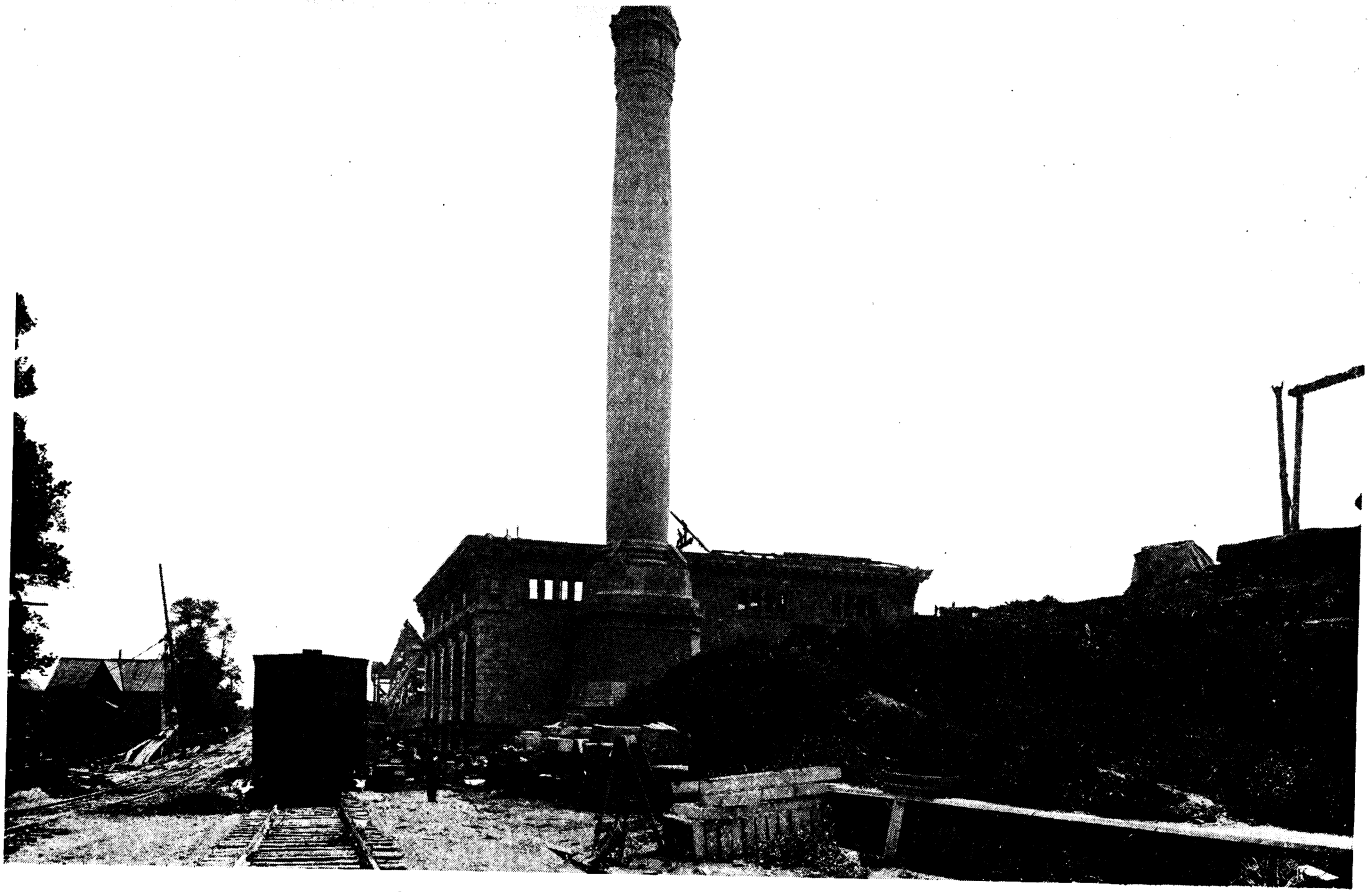
Another filter was operated during the year by the "Nichols Separators" method.

Number of runs	8
Average length of runs, days	28.04
Average m. g. filtered per run	58.52
Average m. g. filtered per acre per run.....	77.82
Average cost of labor, scraping, raking and spading per m. g.	$0.282
Average cost of washing per m. g. filtered.....	0.406
Average cost of water per m. g. filtered.....	0.03
Average cost per m. g. labor, spading, scraping, washing, water, etc.....	0.72
Average gallons water used to wash per m. g. filtered..	1,905
Depth of sand scraped per run.....	1.08
Cubic yards sand scraped per m. g. filtered.....	1.813
Daily average turbidity of applied water.....	11.00
Daily average bacteria in applied water.....	18,330

In filters Nos. 1, 2, 3, 7, 11 and 17, 1,430 cubic yards of sand were placed during the year by Bureau labor with the use of the Nichols separator, at a cost of 44 cents per cubic yard.

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

	Per cent.
Average reduction, turbidity	99.39
Average reduction, bacteria	99.00
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.93
Minimum reduction, turbidity	94.44
Minimum reduction, bacteria	97.62



QUEEN LANE FILTERS.—Power House and Chimney.

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

	Per cent.
Average reduction, turbidity	99.78
Average reduction, bacteria	99.64
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.97
Minimum reduction, turbidity	95.83
Minimum reduction, bacteria	98.43

During the year filtered water continued to be stored in the George's 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.

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, and 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 75,910,490,000 gallons, an increase of 2,352,490,000 gallons over that of 1909. The daily average was 207,974,000 gallons, equivalent to an average rate of 4.18 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 $138,194.20, or $1.82 per million gallons of water filtered, making the total expense of pumping the water from the river and filtering it $3.99 per million gallons filtered.

Of this amount $22,864.11 was for operating the preliminary filters and $14,183.33 the cost of the laboratory, or $0.30 and $0.186 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 229,000,000 gallons, equivalent to an average rate of 4.86 million gallons per acre per day for the area in service.

The total number of runs or cleanings was 651, a decrease of 189 over 1909, an average of about ten cleanings per filter per year, and an average length between cleanings of 33.65 days, an increase of 7.35 days over the previous years.

The average quantity filtered between runs was 113.97 million gallons, equivalent to 162.77 million gallons per acre per run.

The standard method of cleaning adopted for 1910 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	558
Average length of runs, days	35.19
Average million gallons filtered per run	118.28
Average million gallons filtered per acre per run	144.53
Cost of water to wash per million gallons	$0.01
Cost to rake, scrape and wash per million gallons	0.65
Total cost to clean	0.66
Average gallons water used to wash per million gallons	2,027
Cubic yards scraped per million gallons filtered	1.67
Average turbidity of applied water	8.00
Average bacteria in applied water	2,220

At the beginning of the year, owing to the extreme, long-continued turbidity of the Delaware river water, and also the fact that nearly all the filters were operating at a comparatively high loss of head when the turbid condition of the water occurred, it was necessary, in order to keep the filters in service, to work a night force on cleaning filters for some time.

The filters were cleaned at this time in the usual manner, by scraping and ejecting and washing in the courts, and the costs, which were naturally high, are as follows:

Number of runs	93
Average length of runs	24.46
Average million gallons filtered per run	88.18
Average million gallons filtered per acre per run	105.21
Average cubic yards scraped per run	231.50
Average cubic yards scraped per million gallons filtered	2.63
Average cost to scrape per cubic yard of sand	$0.15
Average cost to remove and wash per cubic yard of sand	0.27
Average total cost per cubic yard, inc. water	0.43
Average total cost per m. g. to clean filters, inc. water.	1.14
Average total cost per m. g. to clean filters and replace sand, inc. water	1.80
Average gallons water used to remove and wash per cubic yard sand	2,850

There is quite a difference in cost between the two methods, but this was due largely to the circumstances; the work was done under emergency conditions continued night and day in extremely bad weather with turbid water that naturally shortened the amount filtered between cleanings.

The total cost of cleaning under emergency conditions was $1.80 per million gallons filtered while under normal conditions and water, the average cost for the year was but $0.66 per million gallons filtered.

The total cost of operating the entire filter station, including superintendence, supplies, repairs, cleaning, laboratory, pre-filters, lighting, wash water, but not the

low service pumping station, during September, 1910, was $1.39 per million gallons filtered, of which $0.30 was for preliminary filtration and $0.16 for the laboratory, and but $0.43 was for cleaning filters. The water previously and during this month was good, a large amount was filtered between cleanings and the cost was correspondingly low.

To guard against the trouble experienced at the beginning of the year, the filters after November 1st were cleaned in rotation and even with the water then applied, they would have filtered many million gallons more before it was necessary to put them out of service; in other words, the loss of head on all the filters was after that date kept low, so that when the period of turbid water occurred a large number of the filters would not go out of service at one time.

The resanding was done during the year by Bureau labor, using the Nichols Separators. Thirteen thousand seven hundred and seventeen cubic yards were replaced in filters Nos. 1, 7, 8, 13, 14, 16, 18, 25, 29, 32, 35, 38, 49 and 51, at a cost of 25¼ cents 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	99.12
Average reduction, bacteria	99.36
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.93
Minimum reduction, turbidity	95.45
Minimum reduction, bacteria	98.40

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 average reductions in turbidity and bacteria for the year were 67.4 and 68.5 per cent., respectively.

The average turbidity of the applied water to the pre-filters was 25 and the maximum 260. The per cent. of wash water used for the year averaged one per cent. of the amount filtered.

The number of cleanings for the pre-filters was 40,119, an average of 334 cleanings to each filter, or about 1.1 days between cleanings for the year.

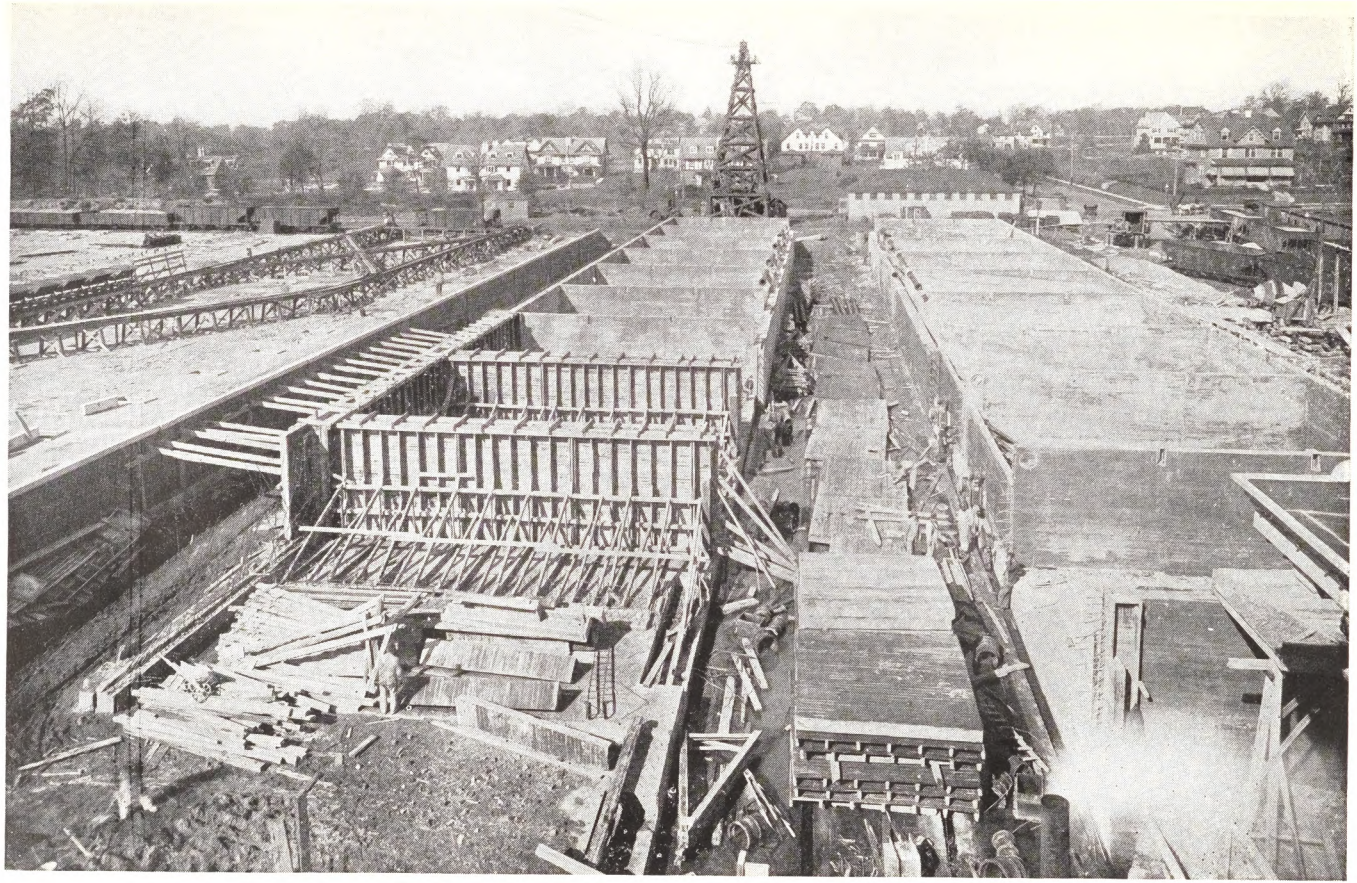
The total amount pre-filtered was 77,781 million gallons, requiring 778 million gallons of wash water.

Cost of Operation of Filters for 1910.

	Upper Roxboro.	Lower Roxboro.	Belmont.	Torresdale	Total.
Office	$1,475 96	$1,513 29	$2,519 86	$6,678 35	$12,187 46
Filter attendants	2,532 03	1,204 20	2,418 91	11,545 80	17,700 94
Cleaning filters	6,385 06	4,813 40	10,101 74	63,341 40	84,641 60
Labor on grounds	186 64	207 89	1,419 25	5,300 54	7,114 32
Janitors and w'chmen	1,181 42	1,174 39	1,500 02	1,802 00	5,657 83
Maint. and repairs	1,240 99	857 25	6,996 26	8,160 57	17,255 07
Laboratory	2,374 42	2,376 41	3,336 99	14,183 33	22,271 15
Lighting	280 44	110 06	4,636 12	4,318 10	9,344 72
Totals for final filters	$15,656 96	$12,256 89	$32,929 15	$115,330 09	$176,173 09

Pre-Filters.

	Upper Roxboro.	Lower Roxboro.	Belmont.	Torresdale	Total.
Filter attendants		$1,201 75	$2,460 56	$12,372 00	$16,034 31
Labor				2,628 63	2,628 63
Maint. and repairs		3,020 09	5,004 02	7,863 48	15,887 59
Totals for pre-filters		$4,221 84	$7,464 58	$22,864 11	$34,550 53
Total cost of plant	$15,656 96	$16,478 73	$40,393 73	$138,194 20	$210,723 62
Million gals. filtered	5,067.85	3,417.04	14,107.97	75,910.49	98,503.35
Cost per million gals.:					
Final filters	$3 09	$3 59	$2 33	$1 52	$1 79
Pre-filters		1 23	53	30	37
Total cost per M. G.	$3 09	$4 82	$2 86	$1 82	$2 14



QUEEN LANE FILTERS.—View of Preliminary Filter Tanks from Power House.

Comparison of Pumpage for 1909 and 1910.

	GALLONS.			
	1909.	1910.	Increase.	Decrease.
Annual pumpage from rivers	111,129,767,510	114,938,585,836	3,808,818,326	
Average daily pumpage from rivers	304,465,116	314,900,235	10,435,119	
Pumpage per capita per day	196.2	203.2	7.00	
Maximum daily pumpage from rivers during months of greatest consumption	362,348,840	352,124,270		10,224,570
Pumpage per capita during months of greatest consumption	233.5	219.3		14.2
Total supplementary pumpage at high service stations	8,184,451,942	7,969,681,140		214,770,802
Torresdale station, low service pumpage from Delaware river	75,189,485,350	78,529,359,650	3,339,874,300	

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

Volume and Cost of Direct Pumpage for the Years 1900 to 1910 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.
1900	104,704,533,711	215,632,475,308	$2 80	221.7	†1,293,697
1901	101,836,624,094	208,180,044,728	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	120,386,160,615	247,368,530,965	5 04	234.0	1,407,690
1905	119,483,641,811	257,447,392,820	4 93	227.7	1,437,730
1906	116,732,205,859	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	*114,938,585,836	284,227,631,428	3 93	203.2	†1,549,000

*Meters used at Belmont, Queen Lane and Roxborough. †U. S. Census.

Volume and Cost of High Service Pumpage for the Years 1900 to 1910 Inclusive.

Years.	Number of gallons pumped.	Number of gallons pumped 100 feet high.	Cost per million gallons pumped 100 feet high.
1900	2,811,042,344	2,487,057,313	$14 94
1901	1,968,833,130	2,276,802,775	17 86
1902	2,338,260,121	2,855,932,559	18 02
1903	2,484,635,469	3,119,047,084	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 58
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

Volume and Cost of Low Service Pumpage for the Years 1900 to 1910 Inclusive.

Years.	Number of gallons pumped.	Number of gallons pumped 100 feet high.	Cost per million gallons pumped 100 feet high.
1900			
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

*Roxborough Low Service Station started July 3, 1903.
†Torresdale station started July 15, 1907.
‡Frankford plus 3,300,000,000 gallons.

Cost of Raising 1,000,000 Gallons 100 Feet High During 1909 and 1910.

Pumping stations.	1909.	1910.	Increase.	Decrease.
Fairmount	$12 99	$71 18	$58 19	
Spring Garden	14 33			$14 33
Belmont	5 64	5 39		25
Queen Lane	5 50	4 69		81
Shawmont	5 89	5 44		45
Lardner's Point No. 1	9 94	30 36	20 42	
Lardner's Point No. 2	2 80	2 99	19	
Lardner's Point No. 3	2 06	2 19	13	
Average	$4 12	$3 93		$0 19
High Service Stations.				
George's Hill	$17 69	$16 91		$0 78
Roxborough	12 08	18 67	$6 59	
Chestnut Hill				
Wentz Farm	27 12	27 76	64	
Average	$16 90	$19 80	$2 90	
Low Service Stations.				
Roxborough	$17 46	$23 86	$6 40	
Torresdale	4 77	5 01	24	
Total averages	$4 42	$4 30		$0 12

Comparison of the Capacity and Average Daily Pumpage for 1909 and 1910.

Pumping Stations.	Capacity.		Average.	
	1909.	1910.	1909.	1910.
Fairmount	33,290,000	33,290,000	2,873,268	495,830
Spring Garden	170,000,000	170,000,000	9,468,630	
Belmont	73,500,000	67,000,000	43,152,588	42,688,010
Queen Lane	80,000,000	80,000,000	29,873,008	38,646,363
Shawmont	51,500,000	51,500,000	31,078,962	26,962,224
Total from Schuylkill	408,290,000	401,790,000	116,446,456	108,792,427
Increase				
Decrease		6,500,000		7,654,029
Lardner's Point No. 1	57,000,000	57,000,000	8,151,263	1,594,509
Lardner's Point No. 2	120,000,000	120,000,000	100,894,003	97,326,978
Lardner's Point No. 3	120,000,000	120,000,000	82,432,776	107,186,347
Total from Delaware	297,000,000	297,000,000	191,478,042	206,107,834
Increase				
Decrease				
Total from Delaware and Schuylkill rivers	705,290,000	698,790,000	307,924,498	314,900,261
Increase				
Decrease		6,500,000		
High Service Stations.				
George's Hill	11,000,000	11,000,000	2,436,838	2,695,916
Roxborough	10,000,000	10,000,000	4,888,013	4,120,982
Mt. Airy	3,000,000	3,000,000	188,407	9,354
Chestnut Hill	750,000	750,000		
Wentz Farm	7,000,000	7,000,000	1,260,170	1,123,973
Total high service	31,750,000	31,750,000	8,773,428	7,950,225
Increase				
Decrease				

Low Service Stations.

Pumping Stations.	Capacity.		Average.	
	1909.	1910.	1909.	1910.
Low Service Stations.				
Roxborough	30,000,000	30,000,000	13,649,730	13,884,517
Torresdale	280,000,000	325,000,000	205,998,590	215,148,931
Total low service	310,000,000	355,000,000	219,648,320	229,033,448
Increase		45,000,000		
Decrease				
Total daily	1,047,040,000	1,085,540,000	536,346,246	551,883,934
Increase		38,500,000		15,537,688
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 Draughtsman.

Distribution.

The total quantity of pipe laid was 137,242 feet of which 125,819 feet were service mains from 4 to 16 inches in diameter, 3,988 feet pumping and supply mains from 12 to 48 inches in diameter, in addition to which 7,435 feet of pipe were laid for fire hydrants and other connections.

The total length of new pipe laid was 134,364 feet, equal to 25.45 miles, making in addition to that previously laid 1,637.60 miles now in use.

Of the above 14.24 miles were laid by private contract on account of the Bureau being without pipe and having no funds with which it could be purchased.

The total number of additional fire hydrants put in during the year was 727, making the total number in use 16,288. Of these 694 are on the High Pressure Fire Service and are under the jurisdiction of the Bureau of Fire.

The total number of drills for attachments, from one-half to six inches in diameter, was 9,887.

The total number of meters in use was 1,895.

The total number of dwellings with water was 315,326, an increase of 12,404 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,

Very respectfully yours,

FRED. C. DUNLAP,

Chief of Bureau.

APPENDIX A

REPORT OF CHIEF CLERK

Philadelphia, January 18, 1911.

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 1910.

Yours respectfully,

J. T. HICKMAN,
Chief Clerk.

Detailed Expenditures of Bureau for 1910.

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, 1909	$961,791 06			
Balance from books of 1909	1,647,340 90			
Increased by additional appropriations	563,800 00			
	$3,172,931 90			
Diminished by transfer	66,695 08			
Net appropriation		$3,106,236 82		
Item 1—Salaries	$532,195 00			
Diminished by transfer	59,111 65			
Net appropriation to item		473,083 35		
Chief of Bureau		$10,000 00		
Chief Clerk and assistants		4,875 00		
Stenographers		2,700 00		
Correspondence clerk		1,000 00		
Time clerk		1,000 00		
Messenger		720 00		
Draughtsmen		5,014 83		
Superintendent and assistant		5,000 00		
Clerk and paymaster and assistant		2,178 49		
Clerks		2,620 94		
Assistants to Chief		6,299 19		
Superintendents of filters		2,499 96		
Chemists and assistants		5,440 00		
Bacteriologists		3,000 00		
Assistant clerks		3,609 00		
Pipe inspector and clerk		2,500 00		
Search clerk		1,300 00		
Chief inspector		1,200 60		
Inspector		17,991 87		
Permit clerk and assistant		2,500 00		
Purveyors		10,197 03		
Purveyors' clerks		6,272 82		
Purveyors' assistant clerks		5,162 34		
Yardkeeper		852 37		
Hydrant inspectors		7,567 79		
General foremen		8,150 10		
Foremen of repairs		7,650 00		
Superintendent of shop and clerk		2,400 00		
Stop attendants		2,933 34		
General storekeeper		866 67		
Foreman machinist		2,000 00		
Foreman bricklayer		1,600 00		
Foreman, City shop		1,396 23		
Foreman carpenter		1,176 67		
Foreman plumber		1,000 00		
Foreman stonemason		333 32		
Foreman painter		1,000 00		
Foreman rigger and assistant		1,897 58		
Watchmen		6,084 26		
Janitor, main office		720 00		
Lineman		1,200 00		
Telephone operators		1,600 00		
Laboratory assistant		720 00		
Registrar		1,200 00		

Detailed Expenditures of Bureau for 1910—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 1—Continued.				
Salaries at stations:				
Fairmount		$8,173 50		
Spring Garden		14,654 16		
Belmont		50,084 89		
Belmont High Service		6,712 57		
Queen Lane		20,118 07		
Shawmont		44,853 16		
Roxborough High Service		12,212 94		
Mt. Airy		3,963 47		
Chestnut Hill		1,312 50		
Lardner's Point		111,548 44		
Wentz Farm		11,052 02		
Torresdale		11,894 31		
Belmont Filters		9,361 31		
Lower Roxborough Filters		3,224 41		
Upper Roxborough Filters		6,266 69		
Uniforms for policemen and watchmen		1,780 00		
		$472,633 24	$450 11	
Item 1b. Salaries				
Appropriation from loan, December 3, 1910	$2,500 00			
Lower Roxborough Filters		$326 96		
Belmont Filters		924 03		
Torresdale Filters		1,213 94		
		$2,464 93		$35 07
Item 2. For wages of mechanics, laborers and other workmen employed upon repairs to machinery, and the maintenance of and repairs to buildings, grounds and reservoirs, and the transportation of workmen incident thereto $150,000 00				
Increased by additional appropriation 104,000 00				
Net appropriation to item	$254,000 00			
Transportation		$3,363 00		
Wages:				
Boilermakers		8,623 32		
Bricklayers		8,970 14		
Carpenters		8,884 21		
Crane runner		1,215 58		
Diver		959 86		
Helpers		8,496 22		
Horses, carts and men		3,362 90		
Laborers		150,354 67		
Machinists		48,662 62		
Painters		3,422 70		
Pump erector		925 30		
Stonemasons		1,740 00		
Tinsmiths		2,131 81		
Waste water inspector		707 39		
		$251,819 72	$2,180 28	
Item 2b. For the same purposes as Item 2.				
Appropriation from loan, July 29, 1910	$84,000 00			
Diminished by transfer	1,280 73			
Net appropriation to item	$82,719 27			

Detailed Expenditures of Bureau for 1910—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 2b—Continued.				
Wages:				
Boilermakers		$3,008 69		
Bricklayers		2,985 62		
Carpenters		2,722 87		
Crane runner		390 22		
Diver		288 74		
Helpers		3,057 36		
Horses, carts and men		1,067 59		
Laborers		49,653 43		
Machinists		16,985 93		
Painters		1,292 82		
Pump erector		324 85		
Tinsmith		700 85		
Waste water inspector		240 30		
		$82,719 27		
Item 3. For wages of mechanics, drillers, laborers and other workmen connected with repairs to 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 appropriation 109,000 00				
Net appropriation to item	$259,000 00			
Traveling expenses		774 18		
Transportation		3,978 95		
Wages:				
Improvement		$72,225 20		
First District		17,610 32		
Second District		23,404 68		
Third District		52,021 34		
Fourth District		18,646 04		
Fifth District		18,881 61		
Sixth District		30,148 67		
Seventh District		21,260 20		
		$258,951 19	$48 81	
Item 3b. For the same purposes as Item 3.				
Appropriation, July 29, 1910, loan $91,000 00				
Diminished by transfer 16,000 00				
Net appropriation to item	$75,000 00			
Wages:				
Improvement		$14,543 12		
First District		5,265 84		
Second District		6,566 40		
Third District		13,683 03		
Third District, supplemental		2,393 61		
Fourth District		6,104 32		
Fifth District		7,826 20		
Sixth District		9,131 57		
Seventh District		9,393 29		
		$74,907 38		$92 62

Detailed Expenditures of Bureau for 1910—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 4. For wages of mechanics, helpers and other workmen at the City construction and repair shop..... $20,000 00				
Increased by additional appropriation 7,500 00				
Net appropriation to item.....	$27,500 00			
Wages:				
Blacksmiths	.....	$2,734 71		
Blacksmiths' helpers	.....	2,923 82		
Driver	.....	635 06		
Engineer	.....	729 75		
Laborers	.....	1,064 66		
Machinists, first class	.....	11,511 81		
Machinists, second class.....	.....	1,266 18		
Machinists' helpers	.....	3,187 01		
Patternmakers	.....	3,447 00		
		$27,500 00		
Item 4b. For the same purposes as Item 4.				
Appropriation, July 29, 1910, loan.....	$9,500 00			
Blacksmiths	.....	$1,122 19		
Blacksmiths' helpers	.....	735 00		
Driver	.....	171 00		
Engineer	.....	204 00		
Laborers	.....	493 90		
Machinists, first-class.....	.....	3,917 82		
Machinists, second class.....	.....	378 02		
Machinists' helpers	.....	1,198 18		
Patternmakers	.....	980 00		
		$9,200 11	.....	$299 89
Item 5. For wages of the Hydrographic Corps	$1,596 00	$1,596 00		
Item 6. For repairs to boilers and machinery	$5,000 00			
Arch and jamb brick.....	.....	$276 00		
Bronze rings	.....	16 00		
Brushes	.....	144 75		
Boiler tubes	.....	120 16		
Car bodies	.....	496 00		
Coupling rubber	.....	17 16		
Cylinder	.....	10 50		
Economizer pipe	.....	144 00		
Face plate	.....	27 50		
Gaskets	.....	28 00		
Grate bars	.....	690 25		
Iron castings	.....	349 21		
Iron fittings	.....	88 75		
Liners for engine.....	.....	54 39		
Machine work	.....	1,043 69		
Metal pencils	.....	7 50		
Parts of pump.....	.....	114 30		
Plunger	.....	38 06		
Repairs, copper pipe.....	.....	102 32		
Repairs, machinery	.....	63 56		
Repairs, stoker	.....	23 00		
Rod brasses	.....	66 00		
Spur gears	.....	281 00		

Detailed Expenditures of Bureau for 1910—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 6—Continued.				
Syphons		$20 80		
Tachometer		48 00		
Thermometer		55 00		
Tile		216 66		
Valves		178 15		
Waste		268 96		
		$4,999 67	$0 33	
Item 6b. For the same purposes as Item 6. Appropriation, July 29, 1910, loan	$2,500 00			
Armature		$76 63		
Bushings		65 00		
Brushes		32 70		
Charts		3 38		
Diaphragms		4 30		
Fittings		310 54		
Fire brick		62 50		
Frames and doors		66 49		
Frames and tiling		51 68		
Freight		23 50		
Hoisting rope		99 74		
Iron castings		122 07		
Machine work		674 36		
Metal pencils		7 50		
Packing		112 68		
Repairs, copper pipe		16 05		
Repairs, crane		31 60		
Repairs, electrical		136 42		
Shaft		28 85		
Spur gears		108 00		
Terra cotta duct		133 10		
Valves		35 91		
Valve caps		40 00		
Valve springs		110 00		
Water gauge		75 00		
Worm gear		62 00		
		$2,500 00		
Item 7. Hauling water pipe and machinery	$2,500 00	$2,497 67	$2 33	
Item 7b. For the same purposes as Item 7. Appropriation, July 29, 1910, loan	4,000 00			$4,000 00
Item 8. For repairs to roofs	$500 00			
Diminished by transfer	500 00			
Item 8½. Repairs to roofs. Balance, January 1, 1910	75 00			75 00
Item 9. For extra clerk hire in writing up duplicates	$500 00			
Additional appropriation	3,000 00			
	$3,500 00			
Diminished by transfer	27 70			
	3,472 30	3,472 30		

Detailed Expenditures of Bureau for 1910—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 10. For keep of horses for general superintendent and assistant to Chief, and for keep of automobile for Chief of Bureau	$2,000 00	$2,000 00		
Item 11. For advertising, postage, horseshoeing, miscellaneous expenses, repairs to wagons, carts, harness, tools, pipe, pavements and incidentals, ground rent of 918 Cherry street, and electric current	2,000 00			
Blank forms		$41 50		
Book holder		5 00		
Copies of "Engineering News"		5 40		
Electric current		93 01		
Engineer supplies		41 34		
Grass seed		65 40		
Hauling		23 25		
Hire of automobile		66 00		
Hire of pitometer		420 00		
Horseshoeing		237 47		
Incidentals		133 61		
Laboratory supplies		2 25		
Office supplies		79 97		
Oxygen		7 50		
Postage stamps		138 30		
Professional services, V. S.		25 25		
Repairs, case		4 50		
Repairs, gauge		4 85		
Repairs, harness		20 80		
Repairs, level		6 50		
Repairs, telephone		2 25		
Repairs, pipe		10 42		
Repairs, typewriter		21 70		
Repairs, wagons		149 00		
Seal and press		10 95		
Serving daily papers		13 71		
Stove grate		3 25		
Subscriptions, periodicals		14 00		
Telephone rental		238 83		
Transportation		75 00		
Unloading coal		33 48		
Use of dump		5 00		
		$1,999 49	$0 51	
Item 11a. For the same purposes as Item 11, loan. Balance, January 1, 1910	$1,389 53			
Advertising		60 75		
Bolts and gaskets		191 38		
Electric supplies		9 50		
Engineer supplies		9 65		
Ground rent, 918 Cherry street		26 66		
Gum goods		14 64		
Hardware		68 00		
Horseshoeing		32 50		
Incidentals		21 71		
Oil heater		4 50		
Oxygen		10 00		
Paper hanging		21 00		
Postage stamps		84 30		
Professional services, V. S.		6 00		

Detailed Expenditures of Bureau for 1910—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 11a—Continued.				
Repairs, electric		$8 58		
Repairs, pipe		7 35		
Repairs, scale		4 00		
Rent of fire extinguishers		22 50		
Rent of telephones		95 40		
Rent of pitometer		630 00		
Ring buoys		6 40		
Settee		22 50		
Serving daily papers		1 89		
Subscription		1 50		
Syphon pump		10 00		
Text book		5 00		
Type		4 22		
Urinal		9 60		
		$1,389 53		
Item 11b. For the same purposes as Item 11.				
Appropriation, July 29, 1910, loan	$3,000 00			
Binding books		20 00		
Electric current		6 00		
Engineers' supplies		168 34		
Hardware		44 23		
Horseshoeing		1,169 77		
Incidentals		6 71		
Office supplies		74 30		
Oxygen		20 00		
Paper		10 86		
Parts of meters		107 70		
Postage stamps		208 34		
Printing		99 20		
Professional services, V. S.		30 25		
Repairs, bag		2 75		
Repairs, clocks		27 50		
Repairs, copper pipe		35 80		
Repairs, electric		25 80		
Repairs, harness		158 00		
Repairs, machine		4 02		
Repairs, pipe		29 65		
Repairs, wagons		447 10		
Rerailing locomotive		29 81		
Supporting tracks		5 38		
Tarvia		17 01		
Tiling		20 00		
Telephone rental		218 23		
Text book		5 00		
Valve		8 25		
		$3,000 00		
Item 12. For hauling ashes from pumping stations	$3,000 00	$2,816 66	$183 34	
Item 12b. For the same purposes as Item 12.				
Appropriation, July 29, 1910, loan	2,000 00	1,937 50		$62 50
Item 13. For the purchase of materials connected with and repairs to machinery, mains, buildings, sidings and reservoirs	2,500 00			
Bearings		17 87		
Bricks		2 80		
Brass fittings		82 73		
Charts		3 76		
Coal screens		6 15		

Detailed Expenditures of Bureau for 1910—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 13—Continued.				
Copper gauge		$2 00		
Copper tubes		46 75		
Drills		10 80		
Dynamite		10 50		
Electrical material		332 86		
Fittings		61 80		
Hardware		72 63		
Hubs and dies		15 14		
Iron castings		338 61		
Lumber		527 58		
Metal pencils		7 50		
Machine work		17 55		
Pipe and fittings		38 40		
Pipe-cutting dies		22 50		
Parts of meters		209 09		
Repairs, copper pipe		112 68		
Repairs, gauge		9 35		
Repairs, scale		185 00		
Repairs, siding		244 88		
Repairs, tachometer		20 50		
Saddles		18 00		
Sheave		5 00		
Steel		8 79		
Steel pulleys		32 00		
Stoker boxes		33 00		
Tube roller		3 00		
		$2,499 22	$0 78	
Item 14. For the wages of mechanics, laborers and other workmen employed in the maintenance and operation of the Upper Roxborough, Lower Roxborough, Belmont and Torresdale Filter Stations, the Belmont and Torresdale Laboratories, and the Torresdale Pumping Station	$80,000 00			
Increased by additional appropriations	116,000 00			
Net appropriation to item	$196,000 00			
Salaries		$23,541 50		
Wages:				
Belmont		14,663 61		
Lower Roxborough		6,978 74		
Upper Roxborough		5,371 95		
Torresdale		145,404 55		
		$195,960 35	$39 65	
Item 14b. For the same purpose as Item 14.				
Appropriation, July 29, 1910, loan	$25,000 00			
Increased by transfer	17,225 00			
Net appropriation to item	$42,225 00			
Salaries		2,045 95		
Wages:				
Belmont		2,060 14		
Lower Roxborough		1,064 43		
Upper Roxborough		508 00		
Torresdale		36,531 78		
		$42,210 30		$14 70

Detailed Expenditures of Bureau for 1910—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 15. For resanding the filters, painting and incidental expenses for operating filter plants $10,000 00				
Diminished by transfer 7,000 00				
Net appropriation to item	$3,000 00			
Cedar tanks		$116 12		
Fittings		37 65		
Gas for fuel		498 30		
Incidentals		419 02		
Laboratory supplies		405 88		
Office supplies		171 01		
Packing		139 58		
Repairs, electric		125 50		
Repairs, safe		25 00		
Rings and valves		75 28		
Separators		500 00		
Steel		12 29		
Transportation		331 84		
Waterproofing		51 50		
		$2,908 97	$91 03	
Item 16. For the improvement, extension and filtration of the water supply.				
Appropriation from loans.				
Balance, January 1, 1910	$372 00			
Changes in heating system		372 00		
Item 17. For the completion of the High Pressure Fire Main System.				
Appropriation from loans.				
Balance, January 1, 1910	18 75			$18 75
Item 18. For sand for Torresdale beds.				
Appropriation from loans.				
Balance, January 1, 1910	2,603 62			$2,603 62
Item 19. For the purchase of and repairs to machinery.				
Appropriation from loans.				
Balance, January 1, 1910	$128,367 14			
Arch and jamb brick		$276 00		
Cable		496 27		
Coal chute		88 00		
Cylinder head		288 17		
Electric coils		155 12		
Electric fittings		8 60		
Fittings		353 17		
Freight		21 00		
Gauge glass fittings		149 18		
Grate bars		1,009 87		
Iron caps		130 00		
Motor pinions		152 00		
Parts of pump		116 00		
Repairs, boilers		221 06		
Repairs, engines		1,166 73		
Rewinding armature		53 00		
Steel plates		9 97		
Tube cleaner		104 00		
Valves		103 35		
Valve seats		27 00		
Waste		69 79		
Pump ends, Contract No. 143		3,147 37		

Detailed Expenditures of Bureau for 1910—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 19—Continued.				
Pump ends, Con't No. 139M		$19,787 59		
Pumping engine, Contract No. 138B		35,713 86		
		$63,647 10		$64,720 04
Item 20. For High Pressure Fire System.				
Appropriation from loans.				
Balance, January 1, 1910	$11,835 65			
Iron castings		382 07		
Flanged iron pipe, Contract No. 173L		1,003 15		
Valves and hydrants, Contract No. 173M		2,726 00		
Gray iron castings, Contract No. 173U		7,353 62		
		$11,464 84		$370 81
Item 21. For improvement, extension and filtration of the water supply.				
Appropriation from loans.				
Balance, January 1, 1910	345,132 89			
Affidavits		34 50		
Changes in heating system		106 00		
Copper sulphate		19 69		
Expenses of test trial		100 65		
Granite blocks		59 00		
Interest		83 80		
Iron columns		119 00		
Lightering stone		558 90		
New connection		833 90		
Plants		140 25		
Prime bleach		3,198 67		
Rent of pitometer		510 00		
Reconstructing scale		200 00		
Stone		344 25		
Supporting tracks		362 15		
Structural steel		500 00		
Traveling expenses		688 23		
Transportation		20 00		
Water meters		790 00		
Pumping engines, Contract No. 93		251,698 44		
		$260,367 43		$84,765 46
Item 22. For improvement, extension and filtration of the water supply.				
Appropriation from loan.				
Balance, January 1, 1910	$28,459 05			
Locomotive house, Contract No. 170		1,280 00		
Electric machinery, Contract No. 163		3,223 00		
Floor and railing, Contract No. 168		5,471 20		
Salaries		11,835 48		
		$21,809 68		$6,649 37
Item 23. For the purchase and laying of mains and other purposes connected with the improvement, extension and filtration of the water supply.				

Detailed Expenditures of Bureau for 1910—Continued.

General appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 23—Continued.				
Appropriation from loan.				
Balance, January 1, 1910	$92,872 67			
Laboratory equipment, Contract No. 167		$3,975 00		
Pumping engines, Contract No. 126		82,753 03		
		$86,728 03		$6,144 64
Item 24. For the construction of the Queen Lane Filter Plant.				
Appropriation from loan.				
Balance, January 1, 1910	311,214 60			
Engineer supplies		203 30		
Incidentals		30 70		
Transportation		44 70		
Traveling expenses		36 07		
Filter plant, Contract No. 154		292,406 66		
Salaries		17,096 61		
Wages		1,406 56		
		$311,214 60		
Item 25. For the construction of the Queen Lane Filter Plant.				
Appropriation from loan.				
Balance, January 1, 1910	725,000 00			
Traveling expenses		23 00		
Wages		534 44		
Salaries		16,780 16		
Machining, Contract No. 158		44,460 00		
Filter plant, Contract No. 154		463,999 05		
		$525,796 65		$199,203 35
Item 26. To refund to Alexander Ferguson money paid by him for the laying of water pipe in the following-named streets: Fifty-seventh, Alden and Cecil streets, from Chester to Kingsessing avenue, which water pipe was afterward laid by the said Alexander Ferguson at his own expense.				
Appropriation, December 27, 1910	800 00	800 00		

Recapitulation.

Balance from the books of 1909	$1,647,340 90	
Additional appropriations	563,800 00	
Annual appropriation	961,791 00	
		$3,172,931 90
Expended for improvements	$1,255,525 58	
Expended for maintenance	1,477,858 25	
Expended for refund	800 00	
Amount merging	2,997 17	
Transferred	66,695 08	
Amount not merging	369,055 82	
		3,172,931 90
Deficiency bills of 1910 for maintenance		$9,528 32

APPENDIX B

REPORT

OF THE

GENERAL SUPERINTENDENT

SUBMITTING

TABLES OF EXPENSES, PUMPAGE AND CONSUMPTION OF WATER DURING 1910

Philadelphia, January 18, 1911.

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

DEAR SIR:—I respectfully submit the following report on the operations and the expenses in connection with the work performed at the several pumping stations during 1910:

During the past year the pumpage from the Schuylkill river has increased from 39 to 42 billion gallons, and that from the Delaware river from 72 to 75.2 billion gallons.

From the two rivers 6.4 billion gallons more water was pumped than during the preceding year.

The price of coal averaged one cent per ton more than that purchased in 1909, and the total quantity consumed was 864 tons less than that of the preceding year.

The pumpage at the high service stations averaged 823,200 gallons less per day than that during 1909. This

reduction was due to a decrease in the area supplied from the Roxborough and the Wentz Farm High Service Stations, and to the discontinuance of pumpage at the Mt. Airy Station, which was put out of commission June 11, 1910.

The following tables show the several items of expenditures and the details of pumpage, etc., all of which are respectfully submitted.

Very respectfully yours,

ALLEN J. FULLER,
General Superintendent.

Coal Purchased and Consumed, 1910.

Station.	Classification.	Price per ton.	Purchased.			Consumed.		
			Tons.	Cost.	Total.	Tons.	Cost.	Total.
Spring Garden	Pea	$3 18	2,035	$6,471 30	$6,471 30	2,253	$7,164 54	$7,164 54
Belmont	Pea	3 18	40,039	127,324 02	127,324 02	39,842	126,697 56	126,697 56
Queen Lane	Pea	3 35	24,952	83,589 20	83,589 20	25,098	84,078 30	84,078 30
Roxborough	Pea	3 18	13,343	42,430 74		13,380	42,548 40	
Roxborough	Bituminous	2 74	373	1,022 02		373	1,022 02	
Roxborough	Bituminous	2 86	19,871	56,831 06		19,296	55,186 56	
Roxborough	Bituminous	2 74	419	1,146 77	101,430 59	419	1,146 77	99,903 75
Frankford, No. 1	Bituminous	2 92	3,341	9,755 72	9,755 72	1,456	4,251 52	4,251 52
Frankford, No. 1	Bituminous							
Frankford, No. 2	Bituminous	2 51				9,835	24,685 85	
Frankford, No. 2	Bituminous	2 67	48,885	130,522 95	130,522 95	26,592	71,000 64	95,686 49
Frankford, No. 3	Bituminous	2 51	19,151	48,069 01	48,069 01	9,536	23,935 36	
Frankford, No. 3	Bituminous	2 67				25,783	68,840 61	92,775 97
Totals and averages		$2 94	172,409	$507,162 79	$507,162 79	173,863	$510,558 13	$510,558 13

Coal Purchased and Consumed, 1910—Continued.

Station.	Classification.	Price per ton.	Purchased.			Consumed.		
			Tons.	Cost.	Total.	Tons.	Cost.	Total.
High Service Stations.								
Belmont	Pea	$3 69	1,714	$6,324 64	$6,324 64	1,769	$6,527 61	$6,527 61
Roxborough	Pea	3 65	1,879	6,924 05	6,924 05	1,778	6,489 70	6,489 70
Mt. Airy	Pea	3 69	101	372 69	372 69	134	507 86	507 86
Chestnut Hill	Pea					36	130 68	130 68
Frankford	Pea	3 65	834	3,044 10	3,044 10	988	3,606 20	3,606 20
Totals and averages		$3 66	4,546	$16,665 48	$16,665 48	4,705	$17,262 05	$17,262 05
Low Service Stations.								
Roxborough	Pea	$3 65	4,849	$17,698 85	$17,698 85	4,849	$17,698 85	$17,698 85
Torresdale	Bituminous	2 75	6,487	17,839 25	82,202 46	6,487	17,839 25	68,217 06
		2 60	23,999	62,397 40		18,620	48,412 00	
		*4 07	483	1,965 81		483	1,965 81	
Totals and averages		$2 79	35,818	$99,901 31	$99,901 31	30,439	$85,915 91	$85,915 91

*Special for test.

Coal Purchased and Consumed, 1910—Continued.

Station.	Classification.	Price per ton.	Purchased.			Consumed.		
			Tons.	Cost.	Total.	Tons.	Cost.	Total.
Filters.								
Torresdale								
Belmont		$3 69	1,118	$4,125 43	$4,125 43	1,079	$3,981 51	$3,981 51
Upper Roxborough		3 75	75	281 25	281 25	67	251 25	251 25
Lower Roxborough		3 75	126	472 50	472 50	110	412 50	412 50
Totals and averages		$3 69	1,319	$4,879 18	$4,879 18	1,256	$4,645 26	$4,645 26
Gand total		$2 94	214,092	$628,608 76	$628,608 76	210,263	$618,381 35	$618,381 35
Increase		$0 01						
Decrease						4,693		$11,523 46

Cost of Pumpage, Gallons Pumped and Percentage of Work Done at Stations, 1910.

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	$11,886 52	180,977,997	92.15	166,781,056	$71 18	.06
Spring Garden	29,102 17					
Belmont	250,315 06	*15,581,123,852	298.34	46,482,392,780	5 39	16.35
Queen Lane	169,277 62	*14,105,922,500	255 91	36,097,491,861	4 69	12.70
Shawmont	212,883 10	*9,841,201,837	397.41	39,109,026,448	5 44	13.76
Lardner's Point, No. 1	33,544 75	581,995,790	189.82	1,104,762,841	30 36	.38
Lardner's Point, No. 2	218,461 73	35,524,347,120	206.00	73,181,482,539	2 99	25.75
Lardner's Point, No. 3	192,454 07	39,123,016,740	225.12	88,085,693,903	2 19	31.00
Totals and averages	$1,117,925 02	114,938,585,836	247.28	284,227,631,428	$3 93	100.00
High Service Stations.						
George's Hill	$22,622 49	984,015,220	135 99	1,337,862,990	$16 91	36.37
Roxborough	32,888 21	1,504,157,400	117.53	1,760,920,106	18 67	47.86
Mt. Airy	5,199 33	3,412,500	101.42	3,461,030	1733 11	.09

Cost of Pumpage, Gallons Pumped and Percentage of Work Done at Stations, 1910—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.
Chestnut Hill	$1,588 70					
Wentz Farm	16,019 33	410,247,020	140.59	576,699,990	27 76	15.68
Totals and averages	$78,318 06	2,901,832,140	126.79	3,678,944,116	$21 29	100.00
Grand totals	$1,196,243 08	117,840,417,976	244.32	287,906,575,544	$4 16	
Increase for 1910		3,508,349,524		6,868,149,797		
Decrease for 1910	$20,638 81		1.49		$0 17	
Low Service Stations.						
Roxborough	$26,437 67	5,067,849,000	21.85	1,107,778,521	$23 86	3.00
Torresdale	165,109 63	‡78,529,359,650	42.50	32,982,341,053	5 01	97.00
Totals and averages	$191,547 30	83,597,208,650	40.78	34,090,119,574	$5 62	100.00

*Meters. ‡Frankford plus 3,300,000,000 gallons.

Pumpage from rivers, 57.07 per cent. of total pumpage. Pumpage, high service, 1.44 per cent. of total pumpage. Pumpage, low service, 41.49 per cent. of total pumpage.

val Turbi
val Turbi 5,000,000 Gallons per Day.
val Turbi 5,000,000 Gallons per Day.
0 Gallons per Day.
0 Gallons per Day.

mean suction lift in pounds
inch.

No. 9.

o. 5.	No. 6.	No. 7.	No. 8.	No. 9.	Gallons raised 100 feet high per lb. of coal. Based on meters.
	171	171	183	183	571.02
	176	176	183	183	438 70
	176	176	183	183	555.40
	176	176	183	183	545.09
	176	176	183	183	515.59
	171	171	183	183	599.41
171	171	171	186	186	558.31
171	171	171	183	183	556.69
171		171	183	183	552.75
171		171	183	183	509.91
171		171	183	183	527.52
171		171	183	183	567.95
171	3	172	183	183	521.73

Jonval Turbine No. 1 Capacity 2,000,000 Gals. per Day.
Jonval Turbine No. 3 Capacity 5,330,000 Gals. per Day.
Jonval Turbine No. 4 Capacity 5,330,000 Gals. per Day.
Jonval Turbine No. 5 Capacity 5,330,000 Gals. per Day.

FAIRMOUNT PUMPING STATION 1910.

Total Capacity 33,290,000 Gallons per day.

Jonval Turbine No. 7 Capacity 5,100,000 Gals. per Day.
Jonval Turbine No. 8 Capacity 5,100,000 Gals. per Day.
Jonval Turbine No. 9 Capacity 5,100,000 Gals. per Day.

1910.	Running time of each turbine in hours.							Gallons pumped by each turbine.							Total pumpage for each month.	Average pumpage per day.	Lubricants.		
																	Grease and tallow.	Cylinder oil.	Engine oil.
Months.	No. 1.	No. 3.	No. 4.	No. 5.	No. 7.	No. 8.	No. 9.	No. 1.	No. 3.	No. 4.	No. 5.	No. 7.	No. 8.	No. 9.	Gallons.	Gallons.	Lbs.	Qts.	Qts.
January			48							11,520,851					11,520,851	371,640	10	4	4
February			40							9,565,750					9,565,750	341,634	10	4	4
March			84							19,669,948					19,669,948	634,514		4	4
April			40							9,388,265					9,388,265	312,942	10	4	4
May			112							26,480,762					26,480,762	854,218		6	4
June			80							18,843,375					18,843,375	628,112		6	6
July			64							15,378,038					15,378,038	496,065		6	6
August			69							19,119,975					19,119,975	616,773		6	6
September			70							16,601,071					16,601,071	553,369		6	6
October			40							9,428,372					9,428,372	304,141		4	4
November			48							13,545,102					13,545,102	451,503		6	6
December			48							11,436,488					11,436,488	368,919	2	4	6
Totals and averages										180,977,997					180,977,997	495,830	32	60	60

No. 1—Bethlehem Cross Compound. Capacity 10,000,000 Gallons per Day.
No. 2—Bethlehem Cross Compound. Capacity 10,000,000 Gallons per Day.
No. 4—Worthington Duplex. Capacity 17,000,000 Gallons per Day.

BELMONT PUMPING STATION, 1910.

Total Capacity 67,000,000 Gallons per Day.

No. 5—Holly Rotary Duplex Horizontal Compound. Capacity 10,000,000 Gallons per Day.
No. 6—Holly Rotary Duplex Horizontal Compound. Capacity 10,000,000 Gallons per Day.
No. 7—Holly Rotary Duplex Horizontal Compound. Capacity 10,000,000 Gallons per Day.

1910.	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 and mean suction lift in pounds per square inch.							Gallons raised 100 feet high per lb. of coal, based on meters.
																			Grease and tallow.	Cylinder oil.	Engine oil.								
Months.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	Gallons.	Gallons.	Tons.	Pounds.	Pounds.	Quarts.	Quarts.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	
January	678	633	----------	689	462	348	370	283,488,620	270,291,400	----------	461,834,880	174,966,750	126,113,750	140,140,200	1,456,835,600	46,994,697	3,907	1,283	----------	1,404	1,938	128	128	--------	130	131	131	131	453.40
February	615	613	----------	633	609	480	----------	269,816,020	266,251,280	----------	416,158,080	231,189,350	176,586,200	----------	1,360,000,930	48,571,462	3,349	300	132	1,222	1,432	128	128	--------	130	131	131	--------	475.31
March	678	654	----------	670	354	680	----------	309,085,700	295,662,440	----------	460,570,240	132,410,250	247,094,750	----------	1,444,823,380	46,607,206	3,412	1,920	112	1,454	1,702	128	128	--------	130	131	131	--------	494.46
April	460	601	----------	687	369	707	6	213,306,260	287,713,700	----------	488,824,960	139,412,350	258,925,800	2,119,250	1,390,302,320	46,343,411	3,232	1,625	197	1,606	1,868	128	128	--------	130	131	131	131	501.48
May	626	424	----------	683	429	627	252	285,434,020	192,367,180	----------	493,850,240	163,336,600	229,988,850	88,114,250	1,453,091,140	46,873,908	3,368	1,355	176	1,918	2,210	128	128	--------	130	131	131	131	501.80
June	565	671	----------	639	182	427	330	258,609,420	306,926,580	----------	469,913,600	69,121,850	155,538,250	110,558,700	1,370,668,400	45,688,947	3,134	500	137	1,712	2,202	128	128	--------	130	131	131	131	531.69
July	596	642	----------	714	----------	485	694	265,914,260	276,345,440	----------	527,496,400	----------	175,571,900	245,396,900	1,490,724,900	48,087,900	3,373	110	----------	1,694	3,172	128	128	--------	130	--------	131	131	542.01
August	679	708	----------	680	----------	426	622	301,460,280	308,756,900	----------	496,637,440	----------	153,889,400	214,771,900	1,475,515,920	47,597,288	3,485	1,020	209	2,140	2,568	128	128	--------	130	--------	131	131	512.36
September	453	602	----------	620	----------	553	696	204,957,480	320,218,320	----------	457,932,800	----------	203,095,200	252,068,250	1,438,272,050	47,942,402	3,143	1,105	144	1,860	2,392	128	128	--------	130	--------	131	131	548.92
October	678	642	----------	152	521	654	725	316,823,460	302,931,660	----------	109,416,320	178,803,450	238,889,700	265,018,950	1,411,883,540	45,544,630	3,155	1,325	228	1,470	3,146	128	128	--------	130	131	131	131	580.67
November	643	671	----------	2	621	677	588	291,552,440	304,888,020	----------	1,530,880	226,331,009	246,274,000	215,345,200	1,285,921,540	42,864,051	2,628	425	139	1,274	2,460	128	128	--------	130	131	131	131	659.35
December	707	499	----------	590	672	299	593	305,107,220	205,812,360	----------	337,500,920	244,394,850	109,265,100	216,406,050	1,418,486,500	45,757,629	3,508	1,370	255	1,592	2,390	128	128	--------	130	131	131	131	517.89
Totals and averages	7,378	7,360	----------	6,759	4,219	6,363	4,876	3,305,555,180	3,338,165,280	----------	4,721,666,760	1,559,966,450	2,321,232,900	1,749,939,650	16,996,526,220	46,565,825	39,841	1,922	1,729	19,346	27,480	128	128	--------	130	131	131	131	520.84

Pumpage based on plunger displacement.

Total coal increased 142 tons as per stock account.

No. 1. Southwark Vertical Triple Expansion. Capacity 20,000,000 Gallons per Day.
No. 2. Southwark Vertical Triple Expansion. Capacity 20,000,000 Gallons per Day.

QUEEN LANE PUMPING STATION, 1910.

Total Capacity 80,000,000 Gallons per Day.

No. 3. Southwark Vertical Triple Expansion. Capacity 20,000,000 Gallons per Day.
No. 4. Southwark Vertical Triple Expansion. Capacity 20,000,000 Gallons per Day.

1910.	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 and mean suction lift in lbs. per square inch.				Gallons raised 100 feet high per lb. of coal. Based on meters.
													Grease and tallow.	Cylinder oil.	Engine oil.					
Months.	No. 1.	No. 2.	No. 3.	No. 4.	No. 1.	No. 2.	No. 3.	No. 4.	Gallons.	Gallons.	Tons.	Pounds.	Pounds.	Quarts.	Quarts.	No. 1.	No. 2.	No. 3.	No. 4.	
January	.....	584	337	647	.....	462,176,000	266,048,000	501,446,400	1,229,670,400	39,666,787	2,469	312	823	1,216	1,022	.....	111	111	111	545.88
February	.....	480	321	498	.....	384,729,600	254,419,200	390,982,400	1,030,131,200	35,004,505	2,090	1,400	861	832	634	.....	111	111	111	537.79
March	.....	636	317	555	.....	510,470,400	253,376,000	439,475,200	1,203,321,600	38,816,825	2,704	1,040	978	976	836	.....	111	111	111	485.15
April	.....	146	630	624	.....	117,126,400	495,308,800	487,724,800	1,100,160,000	36,672,000	2,168	80	874	890	666	.....	111	111	111	550.57
May	.....	691	374	575	.....	566,195,200	293,356,800	434,150,400	1,293,702,400	41,732,335	2,227	120	411	616	598	.....	111	111	111	644.45
June	.....	643	368	554	.....	511,174,400	291,494,400	434,828,800	1,237,497,600	41,249,920	1,858	1,080	1,352	1,024	640	.....	111	111	111	743.67
July	70	701	500	350	49,875,200	563,449,600	393,996,800	274,796,800	1,282,118,400	41,358,658	1,844	900	411	1,014	828	111	111	111	111	778.79
August	219	705	258	426	163,897,600	563,833,600	201,401,600	330,355,200	1,259,488,000	41,596,387	1,852	160	1,611	781	639	111	111	111	111	746.83
September	525	690	.....	397	394,476,800	552,046,400	.....	313,676,800	1,260,200,000	42,006,666	1,606	2,060	1,503	1,218	1,050	111	111	.....	111	877.04
October	636	662	.....	346	496,492,800	518,720,000	.....	270,188,800	1,285,401,600	41,464,567	1,902	1,820	1,079	1,018	1,014	111	111	.....	111	764.76
November	587	199	.....	637	384,422,400	239,227,200	.....	512,006,400	1,134,656,000	37,821,866	1,653	280	1,230	818	1,056	111	111	.....	111	759.97
December	529	516	.....	500	419,398,400	408,243,200	.....	399,046,400	1,226,688,000	39,570,580	2,232	1,620	279	360	480	111	111	.....	111	616.27
Totals and averages	2,766	6,653	3,105	6,109	1,908,562,200	5,396,392,000	2,449,401,600	4,788,678,400	14,543,035,200	39,843,932	25,099	1,912	11,412	10,763	9,463	111	111	111	111	642.04

Pumpage based on plunger displacement.

Total coal increased (486 tons) as per stock account.

No. 1—Gaskill Compound. Capacity 10,000,000 Gallons per Day.
No. 2—Worthington Duplex. Capacity 5,000,000 Gallons per Day.
No. 3—Worthington Duplex. Capacity 6,500,000 Gallons per Day.
No. 4—Worthington High Duty Duplex. Capacity 5,000,000 Gallons per Day.
No. 5—Worthington High Duty Duplex. Capacity 5,000,000 Gallons per Day.

SHAWMONT PUMPING STATION, 1910.

Total Capacity 51,500,000 Gallons per Day.

No. 6—Worthington High Duty Duplex. Capacity 5,000,000 Gallons per Day.
No. 7—Worthington High Duty Duplex. Capacity 5,000,000 Gallons per Day.
No. 8—Snow Cross Compound. Capacity 5,000,000 Gallons per Day.
No. 9—Snow Cross Compound. Capacity 5,000,000 Gallons per Day.

1910.	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 and mean suction lift in pounds per square inch.									Gallons raised 100 feet high per lb. of coal. Based on meters.
																							Grease and tallow.	Cylinder oil.	Engine oil.									
Months.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	Gallons.	Gallons.	Tons.	Pounds.	Pounds.	Quarts.	Quarts.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	
January	696	12	31	534	.....	259	407	709	673	295,249,570	2,132,480	7,789,740	93,994,300	.....	37,554,840	73,271,200	184,365,240	178,117,980	872,475,350	28,144,366	2,536	1,940	294	1,036	596	166	149	164	171	.....	171	171	183	183	571.02
February	82	107	586	625	.....	524	607	660	662	33,180,420	19,279,360	150,632,580	95,747,020	.....	73,436,020	102,355,900	171,008,220	178,213,200	823,852,720	29,423,311	2,994	1,230	127	974	620	161	149	150	176	.....	176	176	183	183	438 70
March	672	.....	8	358	.....	215	669	726	728	287,708,190	.....	2,113,440	57,815,640	.....	32,225,660	120,574,540	194,764,920	191,898,660	887,101,050	28,619,389	2,619	1,140	497	956	412	166	.....	169	175	.....	176	176	183	183	555.40
April	600	.....	111	467	.....	143	647	620	707	243,971,490	.....	28,531,440	81,315,220	.....	20,761,960	116,159,240	168,252,360	195,028,500	854,020,210	28,467,340	2,520	310	487	1,250	502	156	.....	154	176	.....	176	176	183	183	545.09
May	508	.....	226	541	.....	219	706	596	687	200,730,390	.....	59,126,340	94,531,640	.....	34,037,340	128,755,240	160,954,920	189,428,460	867,564,330	27,985,946	2,779	200	270	892	560	156	.....	154	176	.....	176	176	183	183	515.59
June	681	.....	.....	479	.....	150	587	703	691	276,639,790	.....	.....	85,821,640	.....	21,951,880	105,467,580	187,957,380	187,028,640	864,866,710	28,828,890	2,376	220	666	1,305	901	156	.....	.....	171	.....	171	171	183	183	569.41
July	737	.....	1	704	515	475	624	741	316	320,105,860	.....	317,730	127,188,780	77,500,240	65,603,720	111,370,080	163,478,760	83,140,860	978,766,030	31,573,098	2,845	380	687	1,772	600	156	.....	154	171	171	171	171	186	186	558.31
August	607	.....	28	538	499	5	629	727	728	252,446,250	.....	7,447,020	88,182,720	72,963,000	588,260	111,517,480	197,112,300	194,407,500	924,664,530	29,827,888	2,759	2,080	544	1,484	724	156	.....	150	171	171	171	171	183	183	556.69
September	712	.....	.....	500	295	.....	543	705	698	291,706,030	.....	.....	78,779,940	45,452,800	.....	91,558,180	191,969,040	186,541,500	886,007,490	29,533,583	2,632	1,260	367	1,454	690	156	.....	.....	171	171	.....	171	183	183	552.75
October	379	146	.....	642	679	.....	585	740	722	152,653,060	31,527,520	.....	113,833,000	109,285,040	.....	102,306,320	203,276,760	198,268,740	911,150,440	29,391,950	2,987	1,640	370	1,286	774	156	154	.....	171	171	.....	171	183	183	509.91
November	640	11	.....	484	431	.....	370	675	711	228,085,000	2,431,680	.....	89,014,860	68,045,200	.....	62,967,340	187,489,560	187,855,260	825,889,500	27,529,650	2,678	890	363	1,176	692	156	150	.....	171	171	.....	171	183	183	527.52
December	733	.....	.....	589	375	.....	534	554	732	257,031,060	.....	.....	106,702,860	56,166,100	.....	92,090,160	153,608,520	193,572,600	859,231,300	27,717,138	2,635	350	234	1,236	744	156	.....	.....	171	171	.....	171	183	183	567.95
Totals and averages	7,047	276	991	6,461	2,794	1,990	6,908	8,156	8,055	2,839,567,110	553,371,040	255,958,290	1,112,927,620	429,412,380	286,159,680	1,218,393,660	2,194,297,980	2,163,501,900	10,555,589,660	28,919,423	33,468	264	4,906	14,821	7,815	158	150	156	172	171	173	172	183	183	521.73

Pumpage based on plunger displacement.

Total coal increased (108 tons—624 pounds) as per stock account.

No. 1—Cramp Marine Compound Rotary. Capacity 10,000,000 Gallons per Day.
No. 2—Corliss Compound Rotary. Capacity 10,000,000 Gallons per Day.

LARDNER'S POINT PUMPING STATION
NO. 1, 1910.
Total Capacity 57,000,000 Gallons per Day.

No. 3—Southwark Vertical Compound Rotary. Capacity 22,000,000 Gallons per Day.
No. 4—Southwark Vertical Compound Rotary. Capacity 15,000,000 Gallons per Day.

1910.	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 and mean suction lift in pounds per square inch.				Gallons raised 100 feet high per lb. of coal.
													Grease and tallow.	Cylinder oil.	Engine oil.					
Months.	No. 1.	No. 2.	No. 3.	No. 4.	No. 1.	No. 2.	No. 3.	No. 4.	Gallons.	Gallons.	Tons.	Pounds.	Pounds.	Quarts.	Quarts.	No. 1.	No. 2.	No. 3.	No. 4.	
January											85	880		12	20					
February											70			6	10					
March											74			6	10					
April											37			6	10					
May											39			6	10					
June	23	116			7,265,450	39,193,920			46,459,370	1,548,645	90		40	80	40	88	77			419.17
July	42	197			13,693,470	70,002,960			83,696,430	2,699,885	210	1,840	20	58	60	81	81			329.12
August	28	229			8,976,720	81,994,380			90,971,100	2,934,551	157	920	25	64	97	83	83			500.22
September	30	203			13,415,430	74,189,820			87,605,250	2,920,175	153		20	60	70	83	83			480.48
October	102	224			32,252,640	81,430,800			113,683,440	3,667,207	211		25	140	112	86	86			478.23
November	128	94			41,629,870	33,863,160			75,493,030	2,516,434	166	2,160	25	160	180	79	79			369.38
December	37	195			11,575,070	72,512,100			84,087,170	2,712,489	162	220	20	120	88	76	83			439.53
Totals and averages	390	1,258			128,808,650	453,187,140			581,995,790	1,594,509	1,456	1,540	175	718	707	82	81			338.57

Six Holly Vertical Triple Expansion. Capacity 20,000,000 Gallons per Day.

LARDNER'S POINT PUMPING STATION,
No. 2, 1910.

Total Capacity 120,000,000 Gallons per Day.

1910.	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 and mean suction lift in pounds per square inch.						Gallons raised 100 feet high per lb. of coal.
																	Grease and tallow.	Cylinder oil.	Engine oil.							
Months.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	No. 10.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	No. 10.	Gallons.	Gallons.	Tons.	Pounds.	Pounds.	Quarts.	Quarts.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	No. 10.	
January	585	652	561	585	668	653	467,781,120	528,322,770	453,056,310	468,044,190	531,678,690	518,958,900	2,967,841,980	95,736,838	2,945	----------	110	1,900	2,226	80	80	80	80	80	80	828.48
February	583	641	493	584	539	655	467,788,230	513,477,090	394,299,270	473,604,210	427,751,820	521,596,710	2,798,517,330	99,947,047	2,800	----------	90	148	1,790	90	90	90	90	90	90	928.08
March	587	681	688	466	682	710	466,693,290	537,153,390	536,797,890	373,303,440	532,979,820	561,746,880	3,008,674,710	97,054,023	3,410	----------	93	1,620	1,720	82	82	82	82	82	82	745.17
April	716	717	711	188	571	606	546,581,250	543,950,550	536,698,350	147,276,540	438,573,240	458,957,610	2,672,037,540	89,067,918	2,940	----------	93	1,630	2,044	114	114	114	85	85	85	960.42
May	737	740	738	595	504	399	593,130,420	588,999,510	571,828,860	486,971,010	391,526,370	308,417,580	2,940,873,750	94,866,895	3,472	----------	93	2,010	2,004	117	117	117	82	82	82	896.85
June	565	577	614	598	644	631	469,992,330	480,316,050	512,161,740	499,534,380	522,776,970	514,053,000	2,998,834,470	99,961,149	2,820	----------	115	2,070	2,070	83	83	83	83	83	83	908.57
July	516	625	711	665	623	578	429,977,250	510,881,940	598,669,110	556,634,790	518,212,350	480,429,810	3,094,805,250	99,832,427	3,565	----------	83	1,750	2,006	86	86	86	86	86	86	883.51
August	573	678	651	595	661	671	411,285,060	522,129,960	530,647,740	423,578,250	545,621,400	542,194,380	2,975,456,790	95,982,477	2,666	----------	93	1,630	1,998	89	89	89	89	89	89	1,018.25
September	650	615	643	584	614	639	528,614,280	495,965,160	518,119,920	476,014,500	500,529,780	508,237,020	3,027,480,660	100,916,022	2,640	----------	93	1,630	1,882	85	85	85	85	85	85	1,005.94
October	596	634	605	652	641	681	472,075,560	507,284,280	482,484,600	528,905,790	516,249,990	546,126,210	3,053,126,430	98,487,949	3,224	----------	115	1,630	2,098	85	85	85	85	85	85	830.70
November	634	523	592	631	610	577	508,528,530	424,566,540	476,099,820	518,382,990	497,166,750	471,848,040	2,896,592,670	96,553,089	2,700	----------	93	1,628	1,884	85	85	85	85	85	85	941.63
December	522	685	688	591	643	688	420,186,780	559,286,820	556,748,550	476,933,250	519,627,240	557,352,960	3,090,105,540	99,680,823	2,949	----------	93	1,708	1,884	89	89	89	89	89	89	965.08
Totals and averages	7,264	7,768	7,695	6,734	7,400	7,488	5,782,634,100	6,212,334,060	6,167,612,160	5,429,153,340	5,942,694,420	5,989,919,040	35,524,347,120	97,326,978	36,427	----------	1,164	18,890	23,606	90	90	90	85	85	85	896.26

Coal increased (296 tons) as per stock account.

LARDNER'S POINT PUMPING STATION No. 3, 1910.

Six Holly Vertical Triple Expansion. Capacity 20,000,000 Gallons per Day Each. Total Capacity 120,000,000 Gallons per Day.

1910.	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 and mean suction lift in pounds per square inch.						Gallons raised 100 feet high per lb. of coal.
																	Grease and tallow.	Cylinder oil.	Engine oil.							
Months.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	Gallons.	Gallons.	Tons.	Pounds.	Pounds.	Quarts.	Quarts.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	
January	738	737	740	554	535	595	579,664,080	596,728,080	597,431,970	478,083,510	461,595,420	505,336,140	3,218,839,200	103,833,523	2,638	----------	124	1,800	2,354	115	115	115	80	80	80	1,247.03
February	672	668	667	483	551	522	538,724,700	546,808,770	559,578,330	415,835,460	472,502,160	444,552,750	2,978,002,170	106,357,220	2,520	----------	112	1,432	2,082	116	116	116	81	81	81	1,217.34
March	686	692	671	620	601	604	534,785,760	552,838,050	556,983,180	531,095,670	526,097,340	511,088,130	3,212,888,130	103,641,552	3,069	----------	124	1,814	2,894	112	112	112	82	82	82	1,043.98
April	673	631	475	678	706	673	553,314,420	531,735,570	409,820,400	576,237,060	609,426,540	568,352,070	3,248,886,060	108,296,202	2,790	----------	120	1,784	2,348	85	85	85	85	85	85	1,015.83
May	519	513	709	682	713	707	435,437,730	444,055,050	610,279,740	591,132,510	617,048,460	611,794,170	3,309,747,660	106,766,053	3,131	----------	115	2,010	2,070	83	83	93	83	83	83	897.57
June	697	716	708	662	656	505	555,091,920	593,244,180	583,787,880	569,034,630	559,848,510	429,024,510	3,290,031,630	109,334,387	2,550	----------	93	1,630	1,882	116	116	116	81	81	81	1,313.52
July	742	736	726	648	712	722	593,471,700	597,005,370	593,869,860	565,500,960	608,651,550	629,768,250	3,588,267,690	115,750,570	3,565	----------	115	2,010	2,070	118	118	118	83	83	83	1,037.54
August	739	743	739	627	665	643	579,792,060	604,961,460	617,880,330	557,317,350	583,432,380	562,073,940	3,505,457,520	113,079,210	3,069	----------	115	2,010	2,070	117	117	117	88	88	88	1,211.27
September	618	616	692	605	557	533	553,143,780	590,080,230	573,229,530	527,945,940	476,505,090	456,611,310	3,177,515,880	105,917,196	2,640	----------	115	2,010	2,070	116	116	116	86	86	86	1,262.43
October	668	718	682	645	619	650	529,431,930	575,803,350	567,612,630	543,623,490	529,012,440	561,789,540	3,307,273,380	106,686,238	2,821	----------	115	2,010	2,070	118	118	118	85	85	85	1,223.48
November	716	709	710	493	591	567	558,846,000	556,037,550	573,983,190	419,447,340	502,740,990	492,203,970	3,103,259,040	103,441,968	2,700	----------	115	2,008	2,072	119	119	119	80	80	80	1,207.31
December	814	741	742	668	597	423	579,223,260	588,267,180	593,130,420	566,922,960	499,505,940	355,798,620	3,182,848,380	102,672,528	3,534	----------	115	2,012	2,068	118	118	118	80	80	80	936.15
Totals and averages	8,282	8,220	8,261	7,365	7,503	7,144	6,590,927,340	6,777,564,840	6,837,587,460	6,342,176,880	6,446,366,820	6,128,393,400	39,123,016,740	107,186,347	35,319	----------	1,378	22,530	26,050	111	111	111	82	82	82	1,113.38

Total coal increased (292 tons) as per stock account.

No. 1—Allis Chalmers Cross Compound. Capacity 6,000,000 Gallons per Day.

GEORGE'S HILL HIGH SERVICE STATION, 1910.

Total Capacity 11,000,000 Gallons per Day.

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

1910.	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 lb. 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	640	104	64,976,580	8,471,480	73,448,060	2,369,292	133	530	21	178	406	59	59	333.92
February	421	251	43,741,620	21,335,480	65,077,100	2,324,182	117	1,240	28	168	272	59	59	336.11
March	744	-------	77,883,120	----------	77,883,120	2,512,359	126	760	31	186	372	59	---------	374.25
April	689	27	76,355,460	3,055,200	79,410,660	2,633,688	117	790	30	180	360	59	59	410.81
May	610	131	66,499,380	15,468,960	81,968,340	2,644,140	116	160	36	372	186	59	59	427.41
June	507	213	56,027,400	24,769,900	80,791,300	2,693,043	114	280	33	243	253	59	59	429.77
July	462	82	78,507,440	9,331,760	87,839,200	2,833,522	104	2,140	31	336	348	59	59	508.09
August	307	426	36,893,740	50,664,060	87,562,800	2,824,606	124	890	33	276	180	59	59	426.94
September	327	393	42,539,580	45,660,500	88,200,080	2,940,002	121	140	34	258	194	59	59	442.30
October	443	301	57,659,040	35,156,240	92,815,280	2,994,041	138	880	10	216	288	59	59	406.86
November	339	380	43,428,960	40,445,220	83,874,180	2,795,806	133	1,670	32	236	140	59	59	380.72
December	353	392	43,835,580	41,309,520	85,145,100	2,746,616	151	2,090	381	204	208	59	59	340.22
Totals and averages	5,842	2,710	688,346,900	295,668,320	984,015,220	2,695,932	1,770	210	710	2,853	3,207	59	59	337.41

Total coal increased (270 tons—1,280 pounds) as per stock account.

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

ROXBOROUGH HIGH SERVICE STATION, 1910.

Total Capacity 10,000,000 Gallons per Day.

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

1910.	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 lb. 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	5	739	1,566,000	127,026,640	128,592,640	4,148,150	151	660	23	108	24	51	51	445.08
February	26	646	6,051,600	108,515,880	114,567,480	4,091,696	142	420	23	108	24	51	51	422.62
March	67	677	15,386,400	116,302,620	131,689,020	4,248,033	145	1,200	23	108	24	51	51	484.08
April	7	713	1,872,000	123,501,100	125,373,100	4,179,107	146	560	22	105	23	51	51	411.52
May	4	740	1,263,600	129,297,940	130,561,540	4,211,663	135	2,200	23	112	24	51	51	503.78
June	8	712	2,304,000	123,478,320	125,782,320	4,192,744	136	1,860	22	92	24	51	51	482.33
July	------	744	----------	138,247,800	138,247,800	4,459,606	152	820	24	93	23	-------	51	476.07
August	12	730	3,160.800	126,680,920	129,841,720	4,188,443	146	1,560	23	93	23	51	51	464.41
September	7	713	1,994,400	123,111,160	125,105,560	4,170,185	126	860	22	90	22	51	51	481.31
October	1	742	208,800	125,521,820	125,730,620	4,055,826	150	500	23	92	24	51	51	447.74
November	6	714	1,612,800	112,781,100	114,393,900	3,813,130	146	260	23	90	22	51	51	410.78
December	2	742	432,000	113,839,700	114,271,700	3,686,183	163	441	23	92	24	51	51	367.39
Totals and averages	145	8,612	35,852,400	1,468,305,000	1,504,157,400	4,120,979	1,777	477	274	1,183	281	51	51	442.33

Total coal increased (54,096 pounds) as per stock account.

No. 1—Davidson Rotary. Capacity 1,000,000 Gallons per Day.

MT. AIRY PUMPING STATION, 1910.

Total Capacity 3,000,000 Gallons per Day.

No. 2—Davidson Rotary. Capacity 1,000,000 Gallons per Day.

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

1910.	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 lb. of coal.
											Grease and tallow.	Cylinder oil.	Engine oil.				
Months.	No. 1.	No. 2.	No. 3.	No. 1.	No. 2.	No. 3.	Gallons.	Gallons.	Tons.	Lbs.	Lbs.	Qts.	Qts.	No. 1.	No. 2.	No. 3.	
January	2			90,000			90,000	2,903	20	2,200		10	4	44			1.94
February	5	2		225,000	90,000		315,000	11,250	19	940	2	4	2	44	44		7.31
March	18	14		810,000	990,000		1,800,000	58,064	23	980	2	20	12	44	44		34.77
April	5	6		225,000	262,500		487,500	16,250	20	1,200		4		44	44		10.74
May		2			90,000		90,000	2,903	20	1,700	2				44		1.96
June	7	7		315,000	315,000		630,000	21,000	21	460		4	4	44	44		13.45
July									9	340							
August																	
September																	
October																	
November									3	1,280							
December									5	1,800							
Totals and averages	37	35		1,665,000	1,747,500		3,412,500	9,349	133	1,492	6	42	22	44	44		11.57

Total coal decreased (25,088 pounds) as per stock account.

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

WENTZ FARM HIGH SERVICE STATION, 1910.

Total Capacity 7,000,000 Gallons per Day.

No. 2—D'Auria Horizontal Compound. Capacity 4,000,000 Gallons per Day.

1910.	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 lb. 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	719	24	26,427,280	1,348,230	27,775,510	895,984	66	1,690		81	81	61	61	267.29
February	671		24,591,200		24,591,200	878,257	59	260	3	76	74	61	61	261.85
March	442	302	15,762,440	16,471,650	32,234,090	1,039,809	69	1,600		116	64	61	61	290.21
April	366	354	13,699,800	19,138,080	32,837,880	1,094,596	68	1,790		94	56	61	61	299.57
May	375	369	13,608,940	20,710,170	34,319,110	1,107,068	72	1,850		112	68	61	61	295.77
June	524	196	20,424,030	12,112,620	32,536,650	1,084,555	60	1,060		86	84	61	61	337.76
July	387	357	17,998,540	24,419,070	42,417,610	1,368,310	70	740		110	66	61	61	378.55
August	375	369	17,225,640	24,014,640	41,240,280	1,330,331	69	1,110		132	88	61	61	372.46
September	360	359	16,456,280	21,663,720	38,120,000	1,270,633	66	1,100		126	74	61	61	359.84
October	489	264	20,131,900	15,965,040	36,096,940	1,164,417	64	2,140		124	80	61	61	348.79
November	377	343	13,882,110	21,415,630	35,297,790	1,176,593	70	2,100		104	96	61	61	312.31
December	379	365	12,111,520	20,668,440	32,779,960	1,057,418	76	260		116	84	61	61	270.30
Totals and averages	5,455	3,302	212,319,680	197,927,340	410,247,020	1,123,964	989	504	3	1,277	914	61	61	260.24

Total coal increased (388,004 pounds) as per stock account.

Total coal increased (388,004 pounds) as per stock account.

Total

ion.	Total pumpage and auxiliary pumpage.	Average per day.	Percentage of pumpage.	Total steam pumpage.	Total water pumpage.
,697	16,603,671,642	535,602,311	8.20	16,592,150,791	11,520,851
,280	15,332,654,864	547,594,816	7.60	15,323,089,114	9,565,750
,824	16,618,017,302	536,065,074	8.20	16,598,347,354	19,669,948
,338	15,808,014,818	526,933,827	7.80	15,798,626,553	9,388,265
,499	16,774,545,973	541,114,387	8.30	16,748,065,211	26,480,762
,088	16,922,467,835	562,082,261	8.40	16,903,624,460	18,843,375
,441	18,113,143,555	584,294,953	9.00	18,097,765,517	15,378,038
,342	17,533,987,641	565,612,504	8.70	17,514,867,666	19,119,975
,729	16,901,404,254	563,380,141	8.50	16,884,803,183	16,601,071
,987	17,464,778,430	563,379,949	8.70	17,455,350,058	9,428,372
,133	16,297,821,706	543,260,723	8.10	16,284,276,604	13,545,102
,089	17,067,118,606	550,552,213	8.50	17,055,682,118	11,436,488
,447	201,437,626,626	551,883,908	100.00	201,256,648,629	180,977,997
,538	6,933,921,824	18,997,046		7,801,686,466	
					867,764,642

Total Gallons Pumped and Consumed During the Year 1910.

Months.	Main pumping stations.								Consumption.			High service stations.						Low service stations.				Average per day.	Total pumpage and auxiliary pumpage.	Average per day.	Percentage of pumpage.	Total steam pumpage.	Total water pumpage.
	Fairmount.	Spring Garden.	Belmont. Meters.	Queen Lane. Meters.	Roxborough. Meters.	Frankford.	Total.	Average per day.	Stored in reservoirs at end of month.	Total.	Average per day.	Belmont.	Roxborough.	Mt. Airy.	Chestnut Hill.	Frankford.	Total.	Average per day.	Roxborough.	Torresdale.	Total.						
December, 1909									896,831,493																	
January, 1910	11,520,851		1,330,589,302	1,131,687,500	808,100,419	6,186,681,180	9,518,579,252	307,050,944	921,341,048	9,494,069,697	306,260,312	73,448,060	123,592,640	90,000		27,775,510	229,906,210	7,416,329	393,505,000	6,461,681,180	6,855,186,180	221,135,038	16,603,671,642	535,602,311	8.20	16,592,150,791	11,520,851
February	9,565,750		1,195,884,117	983,770,000	739,383,217	5,776,519,500	8,704,922,584	310,890,092	970,728,352	8,655,535,280	309,126,260	65,077,100	114,567,480	315,000		24,591,200	204,550,780	7,305,385	371,662,000	6,051,519,500	6,423,181,500	229,399,339	15,332,654,864	547,594,816	7.60	15,323,089,114	9,565,750
March	19,669,948		1,268,348,235	1,148,355,000	804,217,209	6,221,562,840	9,462,153,232	305,230,749	1,088,202,760	9,344,678,824	301,441,252	77,883,120	131,689,020	1,800,000		32,234,090	243,606,230	7,858,265	415,695,000	6,496,562,840	6,912,257,840	222,976,059	16,618,017,302	536,065,074	8.20	16,598,347,354	19,669,948
April	9,388,265		1,217,410,252	1,044,725,000	774,099,961	5,920,923,600	8,956,547,078	298,884,902	934,571,500	9,129,173,338	304,005,945	79,410,660	125,373,100	487,500		32,837,880	238,109,140	7,936,972	407,435,000	6,195,923,600	6,603,358,600	220,111,953	15,808,014,818	526,933,827	7.80	15,798,626,553	9,388,265
May	26,480,762		1,263,499,820	1,256,155,000	806,696,581	6,250,621,410	9,008,363,573	309,947,212	969,333,574	9,573,691,499	308,825,855	81,963,340	130,561,540	90,000		34,319,110	246,933,990	7,965,775	393,622,000	6,525,621,410	6,919,243,410	223,201,400	16,774,545,973	541,114,387	8.30	16,748,065,211	26,480,762
June	18,843,375		1,252,677,250	1,209,652,500	807,601,500	6,335,325,470	9,624,100,095	320,803,337	987,072,581	9,606,361,088	320,212,036	80,791,300	125,782,320	630,000		32,536,650	239,740,270	7,991,342	448,302,000	6,610,325,470	7,058,627,470	235,287,582	16,922,467,835	564,082,261	8.40	16,903,624,460	18,843,375
July	15,378,038		1,373,082,776	1,257,165,000	906,695,391	6,766,769,370	10,319,060,575	332,873,889	1,016,963,715	10,289,199,441	331,909,650	87,889,200	138,247,800			42,417,610	268,504,610	8,661,439	483,779,000	7,041,769,370	7,525,548,370	242,759,625	18,113,143,555	584,294,953	9.00	18,097,765,517	15,378,038
August	19,119,975		1,342,317,473	1,213,215,000	869,122,573	6,571,885,410	10,015,660,431	323,085,820	1,033,408,804	9,999,215,342	322,555,333	87,563,800	129,841,720			41,240,280	258,644,800	8,343,380	412,797,000	6,846,885,410	7,259,682,410	234,183,304	17,533,987,641	565,612,504	8.70	17,514,867,666	19,119,975
September	16,601,071		1,295,531,463	1,233,487,500	825,999,000	6,292,601,790	9,664,220,824	322,140,694	1,029,102,899	9,668,526,729	322,284,224	88,200,080	125,105,560			38,120,000	251,425,640	8,380,854	418,156,000	6,567,601,790	6,985,757,790	232,858,593	16,901,404,254	563,380,141	8.50	16,884,803,183	16,601,071
October	9,428,372		1,374,410,323	1,273,617,500	853,849,895	6,474,683,250	9,985,389,240	322,109,333	1,037,067,252	9,977,424,987	321,852,289	92,815,280	125,730,620			36,096,940	254,642,840	8,214,285	475,663,000	6,749,083,250	7,224,746,250	233,056,331	17,464,778,430	563,379,949	8.70	17,455,350,058	9,428,372
November	13,545,102		1,299,529,663	1,169,565,000	797,013,591	6,075,344,740	9,284,998,096	309,499,936	1,055,358,215	9,266,707,133	308,890,237	83,874,180	114,393,900			35,297,790	233,565,870	7,785,529	428,913,000	6,350,344,740	6,779,257,740	225,975,258	16,297,321,706	543,260,723	8.10	16,284,276,604	13,545,102
December	11,436,488		1,363,043,178	1,204,527,500	848,512,500	6,357,041,691	9,784,569,756	315,630,992	1,104,516,882	9,735,462,089	314,045,228	85,145,100	114,271,700			32,779,960	232,196,760	7,490,218	418,320,000	6,632,041,690	7,050,361,690	227,431,002	17,067,118,606	550,552,213	8.50	17,055,682,118	11,436,488
Totals	180,977,997		15,581,123,552	14,105,922,500	9,841,201,837	75,229,359,650	114,938,585,836	314,900,235		114,730,900,447	314,331,234	984,015,220	1,504,157,400	3,412,500		410,247,020	2,901,832,140	7,950,225	5,067,849,000	78,529,359,650	83,597,208,650	229,033,448	201,437,626,626	551,883,908	100.00	201,256,648,629	180,977,997
Increase during 1910			1,336,341,304	3,679,377,500		3,339,874,300	3,808,818,826	10,435,119		3,034,722,538	8,314,311	94,569,280							85,698,000	3,339,874,300	3,425,572,300	6,262,594	6,933,921,824	18,997,046		7,801,686,466	
Decrease during 1910	867,764,642	3,456,051,055			222,959,081								279,967,500	65,355,987		49,714,595	300,468,802	823,202									867,764,642

Current Expenses of Pumping Stations for the Year 1910.

PUMPING STATIONS.	REPAIRS												OPERATION														Total Expenses
	Engines		Boilers		Electric Lighting		Buildings		Grounds		Improvement		Total	Wages of Employees	Transportation	Coal Consumed		Lubricants, Grease and Tallow.				Packing	Oils for Lighting		Miscellaneous Supplies	Total	
	Material	Wages	Material	Wages	Material	Wages	Material	Wages	Material	Wages	Material	Wages				Tons	Cost	Gallons	Cost	Pounds	Cost	Total		Gallons	Cost			
Fairmount	$2 34	$47 57					$153 56	$283 88	$105 58	$592 88			$1,185 81	$10,239 32	$31 60			30.0	$6 30	32.5	$3 29	$9 59	$9 45	44.	$5 27	$405 48	$10,700 71	$11,886 52
Spring Garden	46 43	453 10	$221 84	$1,193 51	$10 13	$126 11	453 97	3,518 60	51 48	598 97			6,674 14	14,548 93	6 70	2,253	$7,164 54	203.5	32 85			32 85	108 48	54.	7 29	559 24	22,428 03	29,102 17
Belmont	5,736 94	19,825 81	3,974 34	7,004 17	179 73	149 73	772 44	2,620 92	182 82	755 01	$2 42	$0 75	41,205 08	69,487 11	67 65	39,842	126,697 56	11,705.	2,223 69	1,729.	171 25	2,394 94	7,373 37	430.	50 97	3,038 38	209,199 98	250,315 06
Queen Lane	3,305 28	24,867 92	770 85	4,957 94	21 23	419 13	418 07	1,407 86	33 31	468 85	1 66	3 60	36,675 70	41,158 94	72 78	25,098	84,078 30	5,056.5	1,125 80	11,412.	1,141 20	2,267 00	2,872 90	240.	29 49	2,122 51	132,601 92	169,277 62
Shawmont	4,332 14	17,182 06	2,003 70	4,614 04	17 34	228 79	3,176 94	7,829 54	89 01	635 84	80 83		40,280 23	62,786 20	533 70	33,468	99,903 75	5,659.	1,228 03	4,792.	483 50	1,711 53	5,617 88	629.5	76 22	1,973 59	172,602 87	212,883 10
Lardner's Point No. 1	209 58	3,936 59	215 42	1,282 77	1 19	5 00	159 81	653 19	81 94	477 16	91 95	1,152 00	8,266 60	19,835 78	15 24	1,456	4,251 52	452.	95 01	175.	17 75	112 76	596 64			466 21	25,278 15	33,544 75
Lardner's Point No. 2	672 44	9,651 92	3,010 62	9,696 96	245 51	804 98	437 81	2,149 78	44 28	928 40	13	2,507 51	30,150 34	83,421 52	17 64	36,427	95,686 49	10,624.	2,206 89	1,174.	118 33	2,325 22	2,866 53	315.	35 98	3,958 01	188,311 39	218,461 73
Lardner's Point No. 3	751 32	5,626 50	3,141 07	8,069 86	297 44	74 73	914 50	3,728 62	63 16	103 31	4 72	1,180 88	23,956 11	67,152 33	17 64	35,319	92,775 97	12,150.	2,521 15	1,378.	140 10	2,661 25	1,996 60	212.5	25 22	3,868 95	168,497 96	192,454 07
Totals	$15,056 47	$81,591 47	13,427 84	$36,819 25	$772 57	$1,808 47	$6,487 10	$22,192 39	$651 58	$4,560 42	$181 71	$4,844 74	$188,394 01	$368,630 13	$762 95	173,863	$510,558 13	45,885.	$9,439 72	20,602.5	$2,075 42	$11,515 14	$21,441 85	1,925.	$230 44	$16,392 37	$929,531 01	$1,117,925 02
HIGH SERVICE STATIONS.																											
George's Hill	$107 84	$1,067 20	$652 33	$859 34			$35 23	$275 47	$1 39	$248 82			$3,247 62	$12,032 96	$1 80	1,769	$6,527 61	1,495.	$302 55	710.	$71 04	$373 59	$235 35	89.5	$13 84	$189 72	$19,374 87	$22,622 49
Roxborough	69 45	679 41	476 65	741 77	$2 78		71 99	527 40	33	221 30	$3,991 84	$5,848 41	12,631 33	13,147 88	84 60	1,778	6,489 70	366.	83 72	273.5	27 95	111 67	227 84	46.	5 66	189 53	20,256 88	32,888 21
Mt. Airy	1 82	11 58	23 50				1 97			221 29			260 16	4,366 30	4 00	134	507 86	16.	3 54	6.	60	4 14	2 25	4.5	56	54 06	4,939 17	5,199 33
Chestnut Hill				3 85			19						4 04	1,429 83		36	130 68							67.	8 55	15 60	1,584 66	1,588 70
Wentz Farm	185 96	427 13	61 65	252 64	105 56	481 17	187 10	575 29		200 79			2,477 29	9,458 98	9 10	988	3,606 20	796.5	170 97	2.5	25	171 22	80 77	36.	4 74	211 03	13,542 04	16,019 33
Totals	$365 07	$2,185 32	$1,214 13	$1,857 60	$108 34	$481 17	$296 48	$1,378 16	$1 72	$892 20	$3,991 84	$5,848 41	$18,620 44	$40,435 95	$99 50	4,705	$17,262 05	2,673.5	$560 78	992.	$99 84	$660 62	$546 21	243.	$33 35	$659 94	$59,697 62	$78,318 06
LOW SERVICE STATIONS.																											
Roxborough	$273 34	$1,334 32	$4 65	$38 41	$71 39	$20 00	$7 51	$218 18			$29 58		$1,997 38	$6,073 49	$1 20	4,849	$17,698 85	7,623.5	$415 52	21.5	$2 15	$417 67	$78 52	13.5	$1 60	$168 96	$24,440 29	$26,437 67
Torresdale	$966 70	7,427 97	2,925 67	8,195 06	1,854 34	503 88	721 89	3,005 37	$13 48	$1,177 72		$148 40	26,940 48	62,604 37	$24 91	25,590	68,217 06	7,339.5	1,548 89	342.	34 48	1,583 37	1,083 13	151.	19 66	4,636 45	138,169 15	165,109 63
Totals	$1,240 04	$8,762 29	$2,930 32	$8,233 47	$1,925 73	$523 88	$729 40	$3,223 55	$13 48	$1,177 72	$29,58	$148 40	$28,937 86	$68,677 86	$26 11	30,439	$85,915 91	14,963	$1,964 41	363.5	$36 63	$2,001 04	$1,161 65	164.5	$21 46	$4,805 41	$162,609 44	$191,547 30
Grand totals	$16,661 58	$92,539 08	$17,572 29	$46,910 32	$2,806 64	$2,813 52	$7,512 98	$26,794 10	$666 78	$6,630 34	$4,203 13	$10,841 55	$235,952 31	$477,743 94	$888 56	209,007	$613,736 09	63,521.5	$11,964 91	22,048.	$2,211 89	$14,176 80	$23,149 71	2,332.5	$285 25	$21,857 72	$1,151,838 07	$1,387,790 38
Increase, 1910		$6,761 03	$699 06		$844 75	$2,077 53						$2,192 20		$9,991 81				10,713.	$1,842 90	3,595.5	$391 92	$2,234 82	$4,167 22			$174 38		
Decrease 1910	$3,327 39			$2,201 30			$1,194 07	$2,253 99	$1,164 83	$2,659 27	$803 00		$1,029 28		$1,898 60	5,836	$15,739 72							1,007.	$79,48		$1,149 57	$2,178 85

DESCRIPTION OF STEAM BOILERS, BUREAU OF WATER, PHILADELPHIA, 1910.

PUMPING STATION.	TYPE OF BOILERS.	STEAM BOILERS.																		
		Number of Boilers.	Diameter of Shell (inches).	Length of Shell (feet).	Thickness of Shell (inches).	Number of Flues.	Diameter of Flues (inches).	Thickness of Flues (inches).	Length of Flues (feet).	Number of Tubes.	Length of Tubes (feet).	Diameter of Tubes (inches).	Diameter of Steam Drum (inches).	Length of Steam Drum (feet).	Length of Grate (feet).	Area of Grate (square feet).	Area of Heating Surface (square feet).	Estimated Horse-power, at 10 square feet for Shell and Fire Flues, 15 square feet for Tubes and 12 square feet for Drums.	Height of Stack (feet).	Section of Stack (square feet).
Spring Garden	Marine, Steel	24	138	$10\frac{5}{8}$	$1\frac{1}{4}$, $\frac{15}{16}$, $\frac{9}{16}$	Fox 2	corrugated 43	$\frac{3}{8}$	8	188	8	3	42	$12\frac{1}{2}$	$6\frac{1}{6}$	42	1,551	113	100	49
	Furnace Flue, Tubular	8	102	20	$\frac{5}{8}$	2	37	$\frac{3}{8}$	8	90	10	4	.....	.....	$6\frac{1}{6}$	42	1,116	100	150	27
	Tubular	10	72	12	$\frac{1}{2}$	....	.....	....	.....	92	12	4	2 domes 48	14	6	$40\frac{1}{2}$	1,371	95.9	95	25
Belmont	Furnace Flue, Tubular	5	102	20	$\frac{5}{8}$	2	42	$\frac{3}{8}$	8	90	10	4	.....	.....	$6\frac{1}{6}$	42	1,116	100	150	$38\frac{1}{2}$
	Furnace Flue, Tubular	11	102	20	$\frac{7}{8}$	2	42	$\frac{17}{32}$	8	90	9.4	4	.....	.....	$6\frac{1}{6}$	42	1,116	100	150	$38\frac{1}{2}$
	Furnace Flue, Tubular	10	102	20	$\frac{7}{8}$	2	42	$\frac{17}{32}$	8	90	9.4	4	.....	.....	$8\frac{1}{6}$	42	1,116	100	150	$38\frac{1}{2}$
Belmont High Service	Furnace Flue	4	102	20	$\frac{5}{8}$	2	42	$\frac{3}{8}$	$7\frac{1}{2}$	90	10	4	.....	.....	$6\frac{1}{6}$	42	1,116	80	125	20
Belmont Filters	Furnace Flue, Tubular	4	114	$15\frac{5}{6}$	$\frac{3}{4}$	2	38	$\frac{3}{8}$	12	108	12.5	$3\frac{1}{2}$	.....	.....	.....	41	1,302	.....	150	
Queen Lane	Furnace Flue, Tubular	24	102	20	$\frac{5}{8}$	2	42	$\frac{3}{8}$	8	90	10	4	.....	.....	$6\frac{1}{6}$	42	1,116	100	202	113
Roxborough	Water Tube	4	.....	.....	.....	....	.....	....	.....	254	18	4	3-36	21	$8\frac{1}{2}$	102	5,090	500	175	$38\frac{1}{2}$
	Furnace Flue, Tubular	8	102	20	$\frac{7}{8}$	2	42	$\frac{17}{32}$	8	90	9.4	4	.....	.....	$6\frac{1}{6}$	42	1,116	100	175	$38\frac{1}{2}$
Roxborough High Service	Furnace Flue	4	102	20	$\frac{5}{8}$	2	42	$\frac{3}{8}$	$7\frac{1}{2}$	90	10	4	.....	.....	$6\frac{1}{6}$	42	1,116	80	125	20
		2	102	20	$\frac{5}{8}$	2	37	$\frac{3}{8}$	8	90	10	4	.....	.....	$6\frac{1}{6}$	42	1,116	100	125	20
Mt. Airy	Tubular	3	48	10	$\frac{5}{16}$	....	.....	....	.....	48	10	3	1 dome..	.....	4	$16\frac{2}{3}$	475	33	50	$7\frac{9}{16}$
Frankford	Marine, Steel	12	138	$10\frac{5}{8}$	$\frac{15}{16}$, $\frac{3}{4}$	Fox 2	corrugated 43	$\frac{3}{8}$	8	188	8	3	42	$12\frac{1}{2}$	.....	42	1,551	113	150, 100	38, 33
	Furnace Flue, Tubular	12	108	20	$\frac{15}{16}$	2	41	$\frac{17}{32}$	8	195	9.25	$3\frac{1}{2}$	.....	.....	$5\frac{3}{4}$	$40\frac{1}{4}$	1,811.5	110	150	$38\frac{1}{2}$
	Water Tube—Wetzel Stoker	6	.....	.....	.....	....	.....	....	.....	254	18	4	2-36	21	$8\frac{1}{2}$	102	5,090	500	150	$38\frac{1}{2}$
	Water Tube—Wetzel Stoker	8	.....	.....	.....	....	.....	....	.....	252	18	4	2-36	21	$8\frac{1}{2}$	102	5,080	500	150	$38\frac{1}{2}$
Frankford High Service	Furnace Flue, Tubular	3	102	20	$\frac{7}{8}$	2	42	$\frac{17}{32}$	8	90	9.4	4	.....	.....	$6\frac{1}{6}$	$37\frac{1}{2}$	1,116	100	125	12
Torresdale Filters	Water Tube—Murphy Stoker	9	.....	.....	.....	....	.....	....	.....	189	18	$3\frac{1}{2}$	1-48	23	$7\frac{1}{2}$	66	3,280	325	250	

DESCRIPTION OF PUMPING MACHINERY OF THE BUREAU OF WATER PHILADELPHIA, 1910

STEAM ENGINES AND PUMPS.

PUMPING STATION.	Designated Number of Engine or Turbine	TYPES OF ENGINES.	Designated Capacity—Million Gallons per Day.	High Pressure Cylinder.						Int. Pressure Cylinder.						Low Pressure Cylinder.					
				Number of Cylinders.	Bore (inches).	Stroke (feet).	Number of Revolutions.	Speed (feet per minute).	Diameter of Rod (inches).	Number of Cylinders.	Bore (inches).	Stroke (feet).	Number of Revolutions.	Speed (feet per minute).	Diameter of Rod (inches).	Number of Cylinders.	Bore (inches).	Stroke (feet).	Number of Revolutions.	Speed (feet per minute).	Diameter of Rod (inches).
Spring Garden: (Old Station)	5	Southwark Foundry Quarter-Crank Fly Wheel Pump	20	2	44	4	16⅔	133⅓	8	......	......	......	......	......	......	2	88	4	16⅔	133⅓	8
	6	Simpson Compound Rotary	10	1	36	5.17	11	133⅔	4	......	......	......	......	......	......	1	57	8	11	176	5
	7	Cramp Marine Comp. Rotary	20	1	45	6	17	204	8	......	......	......	......	......	......	1	80	6	17	204	8
	8	Worthington Duplex	10	2	38	4	12½	100	4½	......	......	......	......	......	......	2	66 3/16	4	12½	100	2 rods 4
(New Station)	2	Holly Ver. Triple Expansion	30	1	36	5	20	200	7½	1	62½	5	20	200	7½	[illegible]	92	5	20	200	8
	3	Holly Ver. Triple Expansion	30	1	36	5	20	200	7½	1	62½	5	20	200	7½	[illegible]	92	5	20	200	8
	9	Worthington Duplex	15	2	38	4	12½	100	4½	......	......	......	......	......	......	[illegible]	66	4	12½	100	2 rods 4
	10	Worthington Duplex	15	2	38	4	12½	100	4½	......	......	......	......	......	......	2	66	4	12½	100	2 rods 4
Belmont	1	Bethlehem Horz Cross Comp	10	1	34	4	25	200	8	......	......	......	......	......	......	1	70	4	25	200	11
	2	Bethlehem Horz. Cross Comp.	10	1	34	4	25	200	8	......	......	......	......	......	......	1	70	4	25	200	11
	4	Worthington Duplex	20	2	41	4	16¼	130	7	......	......	......	......	......	......	2	82	4	16¼	130	2rods 5
	5	Holly Horz. Compound	10	2	20	3.17	28½	180¼	3¾	......	......	......	......	......	......	2	50	3.17	28½	180¼	2 rods 5¼
	6	Holly Horz. Compound	10	2	20	3.17	28½	180¼	3¾	......	......	......	......	......	......	2	50	3.17	28½	180¼	2 rods 5¼
	7	Holly Horz. Compound	10	2	20	3.17	28½	180¼	3¾	......	......	......	......	......	......	2	50	3.17	28½	180¼	2 rods 5¼
Belmont High Service	1	Allis-Chalmers Horz. Comp	6	2	26	3.5	25	175	4⅞	......	......	......	......	......	......	2	50	3.5	25	175	5½
	2	Worthington Horz. Comp. High Duty	5	2	13	3	26	156	......	......	......	......	......	......	......	2	36	3	26	156	......
Queen Lane Station	1	Southwark Foundry Vert. Triple Expansion	20	1	37	4.5	22	198	2 of 5¼	1	62	4.5	22	198	2 of 5¼	1	96	4.5	22	198	2 of 5¼
	2	Southwark Foundry Vert. Triple Expansion	20	1	37	4.5	22	198	2 of 5¼	1	62	4.5	22	198	2 of 5¼	1	96	4.5	22	198	2 of 5¼
	3	Southwark Foundry Vert. Triple Expansion	20	1	37	4.5	22	198	2 of 5¼	1	62	4.5	22	198	2 of 5¼	1	96	4.5	22	198	2 of 5¼
	4	Southwark Foundry Vert. Triple Expansion	20	1	37	4.5	22	198	2 of 5¼	1	62	4.5	22	198	2 of 5¼	1	96	4.5	22	198	2 of 5¼
Roxborough	1	Gaskill Compound	10	2	33	4	18	144	4½	......	......	......	......	......	......	2	66	4	18	144	5
	2	Worthington Duplex	5	2	36	4	12	96	4½	......	......	......	......	......	......	2	58	4	12	96	4½
	3	Worthington Duplex	6½	2	38	4	12½	100	4½	......	......	......	......	......	......	2	66	4	12½	100	2 rods 4
Roxborough (New House)	4	Worthington Hor. Com. High Duty	5	2	18	3	26	156	2 rods 3	......	......	......	......	......	......	2	50	3	26	156	2 rods 3
	5	Worthington Hor. Com. High Duty	5	2	18	3	26	156	2 rods 3	......	......	......	......	......	......	2	50	3	26	156	2 rods 3
	6	Worthington Hor. Com. High Duty	5	2	18	3	26	156	2 rods 3	......	......	......	......	......	......	2	50	3	26	156	2 rods 3
	7	Worthington Hor. Com. High Duty	5	2	18	3	26	156	2 rods 3	......	......	......	......	......	......	2	50	3	26	156	2 rods 3
	8	Snow Horz. Cross Comp.	5	2	27	3.505	31	217	5	......	......	......	......	......	......	2	60	3.505	31	217	8½
	9	Snow Horz. Cross Comp.	5	2	27	3.505	31	217	5	......	......	......	......	......	......	2	60	3.505	31	217	8½
Roxborough High Service	1	Worthington Duplex	5	2	21	4	12	96	3½	......	......	......	......	......	......	2	36	4	12	96	3½
	2	Worthington Horz. Comp High Duty	5	2	13	3	26	156	......	......	......	......	......	......	......	2	36	3	26	156	
Mount Airy	1	Davidson Pump	1	1	20	1.67	60	200	2¼	......	......	......	......	......	......	......	......	......	......	......	......
	2	Davidson Pump	1	1	20	1.67	60	200	2¼	......	......	......	......	......	......	......	......	......	......	......	......
	3	Knowles Pump	1	1	24	2	20	80	......	......	......	......	......	......	......	......	......	......	......	......	......
Frankford	1	Cramp Marine Comp. Rotary.	10	1	40	5	21	210	6¾	......	......	......	......	......	......	1	69	5	21	210	6¾
	2	Corliss Compound Rotary	10	1	28	3	37	222	3 15/16	......	......	......	......	......	......	1	56	3	37	222	4 15/16
	3	Southwark Foundry Quarter-Crank Compound Pump	22	1	44	3.5	24	168	2 rods 5	......	......	......	......	......	......	1	88	3.5	24	158	2 rods 5
	4	Southwark Foundry Quarter-Crank Fly Wheel Pump	15	2	44	4	16½	132	8	......	......	......	......	......	......	2	88	4	16½	132	8
	5	Holly Vert. Triple Expansion.	20	1	32	5.5	20	220	7½	1	60	5.5	20	220	7½	1	90	5.5	20	220	7½
	6	Holly Vert. Triple Expansion.	20	1	32	5.5	20	220	7½	1	60	5.5	20	220	7½	1	90	5.5	20	220	7½
	7	Holly Vert. Triple Expansion.	20	1	32	5.5	20	220	7½	1	60	5.5	20	220	7½	1	90	5.5	20	220	7½
	8	Holly Vert. Triple Expansion	20	1	32	5.5	20	220	7½	1	60	5.5	20	220	7½		90	5.5	20	220	7½
	9	Holly Vert. Triple Expansion.	20	1	32	5.5	20	220	7½	1	60	5.5	20	220	7½		90	5.5	20	220	7½
	10	Holly Vert. Triple Expansion.	20	1	32	5.5	20	220	7½	1	60	5.5	20	220	7½	1	90	5.5	20	220	7½
	11	Holly Vert. Triple Expansion.	20	1	32	5.5	20	220	7½	1	60	5.5	20	220	7½	1	90	5.5	20	220	7½
	12	Holly Vert. Triple Expansion.	20	1	32	5.5	20	220	7½	1	60	5.5	20	220	7½	1	90	5.5	20	220	7½
	13	Holly Vert. Triple Expansion.	20	1	32	5.5	20	220	7½	1	60	5.5	20	220	7½	1	90	5.5	20	220	7½
	14	Holly Vert. Triple Expansion.	20	1	32	5.5	20	220	7½	1	60	5.5	20	220	7½	1	90	5.5	20	220	7½
	15	Holly Vert. Triple Expansion	20	1	32	5.5	20	220	7½	1	60	5.5	20	220	7½	1	90	5.5	20	220	7½
	16	Holly Vert. Triple Expansion.	20	1	32	5.5	20	220	7½	1	60	5.5	20	220	7½	1	90	5.5	20	220	7½
Frankford High Service	1	Holly Horz. Compound	3	2	12	2	35	140	2 rods 2½	......	......	......	......	......	......	2	32	2	35	140	2 rods 3¼
	2	D'Auria Compound Duplex	4	2	10	1.5	70	210	1⅝	......	......	......	......	......	......	2	20	1.5	70	210	2½
Fairmount	1	Turbine Wheels	2	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	3	" "	5⅓	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	4	" "	5⅓	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	5	" "	5⅓	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	7	" "	5 1/10	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	8	" "	5 1/10	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	9	" "	5 1/10	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Upper Roxborough Filters	1	Buckeye Cross Comp. Vert.	10	1	10	1	260	520	1¾	......	......	......	......	......	......	1	17½	1	260	520	2⅜
Upper Roxborough Filters	2	Buckeye Cross Comp. Vert	10	1	10	1	260	520	1¾	......	......	......	......	......	......	1	17½	1	260	520	2⅜
Upper Roxborough Filters	3	Buckeye Cross Comp. Vert.	10	1	10	1	260	520	1¾	......	......	......	......	......	......	1	17½	1	260	520	2⅜
	4	DeLaval Horz. Turbine	1	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Torresdale Filters	1	R. D. Wood Cross Comp. Horz.	40	1	16	1.67	190	635	3	......	......	......	......	......	......	1	32	1.67	190	635	3
	2	R. D. Wood Cross Comp. Horz.	40	1	16	1.67	190	635	3	......	......	......	......	......	......	1	32	1.67	190	635	3
	3	R, D. Wood Cross Comp. Horz.	40	1	16	1.67	190	635	3	......	......	......	......	......	......	1	32	1.67	190	635	3
	4	R. D. Wood Cross Comp. Horz.	40	1	16	1.67	190	635	3	......	......	......	......	......	......	1	32	1.67	190	635	3
	5	R. D. Wood Cross Comp. Horz.	40	1	16	1.67	190	635	3	......	......	......	......	......	......	1	32	1.67	190	635	3
	6	R. D. Wood Cross Comp. Horz.	40	1	16	1.67	190	635	3	......	......	......	......	......	......	1	32	1.67	190	635	3
	7	Allis Chalmer Cross Comp Horizontal	40	1	16	1.67	190	635	3	......	......	......	......	......	......	1	32	1.67	190	635	3
	8	DeLaval Horz. Turbine	50	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......

PUMPING STATION.	Designated Number of Engine or Turbine	Air Pumps.						Forcing Pumps.								
		Number of Air Pumps.	Bore (inches).	Stroke (feet).	Number of Revolutions.	Diameter of Rod (inches).	Type—Single [S] or Double [D].	Type—Single [S], Double [D], Triple [T], Bucket [B], Plunger [P].	Number of Pumps.	Bore (inches).	Area (square inches), A.	Stroke (feet).	Number of single strokes per minute	Diameter of Pump Rod (inches).	Gallons Displaced per Revolution (Theoretical).	Gallons Displaced per Revolution (Actual).
Spring Garden: (Old Station)	5	4	24	2	16⅔	......	S.	D. P.	2	36½	1,046	4	66⅔	8	848.8	‡827.6
	6	1	30	4	11	......	S.	B. P.	2	B.28½ P.20⅛	638 318	8	22	......	500.	§500.
	7	1	40	3	17	......	S.	D. P.	2	30	707	6	68	8	850.	†824.5
	8	2 2	29¾ 27	2	12½	......	S.	D. P.	2	30	707	4	50	4½	581.	†563.5
(New Station)	2	1	26	5	20	......	S.	T. P.	3	30	707	5	120	6	1080.	‡1053.
	3	1	26	5	20	......	S.	T. P.	3	30	707	5	120	6	1080.	‡1053.
	9	2 2	29¾ 27	2	12½	......	S.	D. P.	2	37	1,075	4	50	5	885.5	†860.
	10	2 2	29¾ 27	2	12½	......	S.	D. P.	2	37	1,075	4	50	5	885.5	†860.
Belmont	1	1	12	1.33	......	1¾	S.	D. P.	2	21¼	354.6	4	100	6	283	†274.5
	2	1	12	1.33	......	......	S.	D. P.	2	21¼	354.6	4	100	6	283	†274.5
	4	2	......	......	......	......	......	D. P.	2	36½	1,046	4	65	7	853.7	‡832.4
	5	1	20	2.5	28½	2½	S.	D. P.	2	22½	398	3.17	114	5½	253.8	†246.2
	6	1	20	2.5	28½	2½	S.	D. P.	2	22½	398	3.17	114	5½	253.8	†246.2
	7	1	20	2.5	28½	2½	S.	D. P.	2	22½	398	3.17	114	5½	253.8	†246.2
Belmont High Service	1	1	12	0.6	60	......	S.	D. P.	2	17¼	234	3.5	100	3⅝	162.4	‡158.3
	2	......	......	......	......	......	S.	D. P.	2	17	227	3	104	2¾	139.6	†135.5
Queen Lane Station	1	1	28	3	......	2¾	S.	T. P.	3	34½	935	4.5	66	......	655.6	‡639.2
	2	1	28	3	......	2¾	S.	T. P.	3	34½	935	4.5	66	......	655.6	‡639.2
	3	1	28	3	......	2¾	S.	T. P.	3	34½	935	4.5	66	......	655.6	‡639.2
	4	1	28	3	......	2¾	S.	T. P.	3	34½	935	4.5	66	......	655.6	‡639.2
Roxborough	1	2	24	2.25	18	......	S.	D. P.	2	25¾	521	4	72	5⅛	424	‡413.
	2	2 2	29¾ 23¾	2 2	12	......	S.	D. P.	2	21	346	4	48	4½	281.3	†272.8
	3	2 2	29¾ 27	2 2	12½	......	S.	D. P.	2	24	452	4	50	5	368.	†357.
Roxborough (New House)	4	......	......	......	......	......	S.	D. P.	2	17	227	3	104	4	137.6	†133.5
	5	......	......	......	......	......	S.	D. P.	2	17	227	3	104	4	137.6	†133.5
	6	......	......	......	......	......	S.	D. P.	2	17	227	3	104	4	137.6	†133.5
	7	......	......	......	......	......	S.	D. P.	2	17	227	3	104	4	137.6	†133.5
	8	1	18	1.5	16	......	S.	D. P.	2	16¼	207.4	3.505	124	5½	142.4	†138.
	9	1	18	1.5	16	......	S.	D. P.	2	16¼	207.4	3.505	124	5½	142.4	†138.
Roxborough High Service	1	4	18	1.58	12	......	S.	D. P.	2	24	452	4	48	3½	372.	†360.8
	2	......	......	......	......	......	S.	D. P.	2	17	227	3	104	2¾	139.6	†133.5
Mount Airy	1	......	......	......	......	......	......	Piston	1	10	78.5	1.67	120	2¼	13.2	‡13.
	2	......	......	......	......	......	......	Piston	1	10	78.5	1.67	120	2¼	13.25	‡13.
	3	......	......	......	......	......	......	Piston	......	......	......	2	40	3 1/16	......	......
Frankford	1	1	24	2.5	21	3¾	S.	D. P.	2	21	346	5	84	6¾	341.3	†331.
	2	1	30	1.17	37	Trunk 6	S.	D. P.	2	20	314	3	148	3 1/16	192.5	†186.7
	3	1	28	1.75	24	......	S.	D. P.	2	28	616	3.5	96	5½	439.2	‡428.2
	4	2	24	......	......	......	S.	D. P.	2	32	804	4	66	8	647.6	‡631.4
	5	1	28	5.5	20	3 11/16	S.	T. P.	3	33	855.3	5.5	20	......	733.	‡715.
	6	1	28	5.5	20	3 11/16	S.	T. P.	3	33	855.3	5.5	20	......	733.	‡715.
	7	1	28	5.5	20	3 11/16	S.	T. P.	3	33	855.3	5.5	20	......	733.	‡715.
	8	1	28	5.5	20	3 11/16	S.	T. P.	3	33	855.3	5.5	20	......	733.	‡715.
	9	1	28	5.5	20	3 11/16	S.	T. P.	3	33	855.3	5.5	20	......	733.	‡715.
	10	1	28	5.5	20	3 11/16	S.	T. P.	3	33	855.3	5.5	20	......	733.	‡715.
	11	1	28	5.5	20	3 11/16	S.	T. P.	3	33	855,3	5.5	20	......	733.	‡715.
	12	1	28	5.5	20	3 11/16	S.	T. P.	3	33	855.3	5.5	20	......	733.	‡715.
	13	1	28	5.5	20	3 11/16	S.	T. P.	3	33	855.3	5.5	20	......	733.	‡715.
	14	1	28	5.5	20	3 11/16	S.	T. P.	3	33	855.3	5.5	20	......	733.	‡715.
	15	1	28	5.5	20	3 11/16	S.	T. P.	3	33	855.3	5.5	20	......	733.	‡715.
	16	1	28	5.5	20	3 11/16	S.	T. P.	3	33	855.3	5.5	20	......	733.	‡715.
Frankford High Service	1	......	......	......	......	......	......	D. P.	2	13⅞	151	2	140	3¼	61.12	‡59.6
	2	......	......	......	......	......	S.	D. P.	2	13	133	1.5	280	2½	40.6	‡39.6
Fairmount	1	......	......	......	......	......	......	Piston	1	16	201	6	24	3⅝	122.	‡119.
	3	......	......	......	......	......	......	Piston	2	22⅜	394.3	6	16	5	470.	‡458.
	4	......	......	......	......	......	......	Piston	2	22	380.1	6	16	5	461.6	‡450.
	5	......	......	......	......	......	......	Piston	2	22	380.1	6	16	5	461.6	‡450.
	7	......	......	......	......	......	......	Piston	2	18 11/16	274.3	6	22	4	333.	‡325.
	8	......	......	......	......	......	......	Piston	2	18⅝	272.4	6	22	4	331.	‡323.
	9	......	......	......	......	......	......	Piston	2	18 11/16	274.3	6	22	4	333.	‡325.
Upper Roxborough Filters	1	2	......	0.66	......	......	......	Centrifu'l	1	......	......	......	......	......	......	......
Upper Roxborough Filters	2	2	......	0.66	......	......	......	Centrifu'l	1	......	......	......	......	......	......	......
Upper Roxborough Filters	3	2	......	0.66	......	......	......	Centrifu'l	1	......	......	......	......	......	......	......
	4	......	......	......	......	......	......	Centrifu'l	1	......	......	......	......	......	......	......
Torresdale Filters	1	......	......	......	......	......	......	Centrifu'l	1	......	......	......	......	......	......	......
	2	......	......	......	......	......	......	Centrifu'l	1	......	......	......	......	......	......	......
	3	......	......	......	......	......	......	Centrifu'l	1	......	......	......	......	......	......	......
	4	......	......	......	......	......	......	Centrifu'l	1	......	......	......	......	......	......	......
	5	......	......	......	......	......	......	Centrifu'l	1	......	......	......	......	......	......	......
	6	......	......	......	......	......	......	Centrifu'l	1	......	......	......	......	......	......	......
	7	......	......	......	......	......	......	Centrifu'l	1	......	......	......	......	......	......	......
	8	1	12	......	200	......	Re'tr	Centrifu'l	2	......	......	......	......	......	......	......

PUMPING STATION.	Designated Number of Engine or Turbine	Forcing Pumps.													
		Diameter Suction Pipe (inches).	Diameter Discharge Pipe (inches).	Number of Suction Valves (on each end).	Lift of Suction Valves (inches).	Area of Suction Valves (square inches).	Number of Discharge Valves.	Lift of Discharge Valves (inches).	Total Area, B (square inches).	Relative Speed of Water, A, B (through valves).	Speed (feet per second) through Valves.	Mean Pressure on Pumps at Pressure Gauge (pounds per square inch).	Corresponding Head (feet).	Lift (feet) from Surface of Water to Centre of Gauge.	Total Lift (feet)
Spring Garden: (Old Station)	5	2 x 36	48	78	½	554	78	½	554	1.84	4.05	110	250	19	269
	6	None	36	16	1½	424	Check.	......	......	1.50	4.04	45	104.6	25	129.6
	7	2 of 30	48	18	1	631	18	1	631	1.12	3.8	66 45	153.5 104.6	21	174.5 125.6
	8	30	30	8	1	280½	8	1	280½	2.50	4.2	86 45	200 104.6	18	218 122
(New Station)	2	48	30	72	½	540	60	½	450	1.57	4.22	......	......	22	
	3	48	30	72	½	540	60	½	450	1.57	4.22	......	......	22	
	9	36	36	12	1	300¾	12	1	300¾	3.58	5.97	66 45	153.5 104.6	16	169.5 120.6
	10	36	36	12	1	300¾	12	1	300¾	3.58	5.97	86 45	200 104.6	16	216 120.6
Belmont	1	30	30	140	½	644	140	½	......	......	......	118	272	13	285
	2	30	30	140	½	644	140	½	......	......	......	118	272	13	285
	4	36	36	36	½	302	36	½	302	......	......	......	......	22	
	5	30	30	79	½	450	79	½	450	1.13	5.	100	233	25	258
	6	30	30	79	½	450	79	½	450	1.13	5.	100	233	25	258
	7	30	30	79	½	450	79	½	450	1.13	5.	100	233	25	258
Belmont High Service	1	24	20	35	⅝	232	35	⅝	232	1.00	3.0	64	147.5	*25.3	122.2
	2	......	......	......	½	......	......	½	......	......	......	73	168.2	*25.3	142.9
Queen Lane Station	1	48	48	89	½	801.5	89	½	801	1.16	3.6	100	231	33	264
	2	48	48	89	½	801.5	89	½	801	1.16	3.6	100	231	33	264
	3	48	48	89	½	801.5	89	½	801	1.16	3.6	100	231	33	264
	4	48	48	89	½	801.5	89	½	801	1.16	3.6	100	231	33	264
Roxborough	1	30	24	126	⅝	500	126	⅝	500	2.70	4.0	164	381	25	406
	2	30	30	31	½	232	31	½	232	2.00	4.6	......	......	21	
	3	30	30	31	½	232	31	½	232	2.50	4.2	148	344	21	
Roxborough (New House)	4	......	......	......	½	......	......	½	......	......	......	164	381	25	406
	5	......	......	......	½	......	......	½	......	......	......	164	381	25	406
	6	......	......	......	½	......	......	½	......	......	......	164	381	25	406
	7	......	......	......	½	......	......	½	......	......	......	164	381	25	406
	8	24	20	90	⅜	330	90	⅜							
	9	24	20	90	⅜	330	90	⅜							
Roxborough High Service	1	30	30	8	1	248	8	1	248	1.82	2.91	53	122	*11.5	110.5
	2	......	......	......	½	......	......	½	......	......	......	53	122	*11.5	110.5
Mount Airy	1	12	10	6	⅝	87	6	⅝	87	0.90	3.00	59	135.9	*25.3	110.6
	2	12	10	6	⅝	87	6	⅝	87	0.90	3.00	59	135.9	*25.3	110.6
	3	42	40	2	......	......	2	......	......	......	......	36	83.7		
Frankford	1	2 of 20	30	10	1	350⅝	10	1	350⅝	9.98	3.45	73	170	16	187.5
	2	30	30	12	¾	420¾	12	¾	420¾	0.75	2.77	73	172	15	187.5
	3	42	40	20	......	290	20	......	290	2.12	.47	......	......	25	
	4	27	36	60	½	465	60	½	465	1.7	7.2	......	......	23	
	5	42	42	144	9/16	1174	144	9/16	1174	.73	3.7	......	......	18	
	6	42	42	144	9/16	1174	144	9/16	1174	.73	3.7	......	......	18	
	7	42	42	144	9/16	1174	144	9/16	1174	.73	3.7	......	......	18	
	8	42	42	144	9/16	1174	144	9/16	1174	.73	3.7	......	......	18	
	9	42	42	144	9/16	1174	144	9/16	1174	.73	3.7	......	......	18	
	10	42	42	144	9/16	1174	144	9/16	1174	.73	3.7	......	......	18	
	11	42	42	144	9/16	1174	144	9/16	1174	.73	3.7	......	......	18	
	12	42	42	144	9/16	1174	144	9/16	1174	.73	3.7	......	......	18	
	13	42	42	144	9/16	1174	144	9/16	1174	.73	3.7	......	......	18	
	14	42	42	144	9/16	1174	144	9/16	1174	.73	3.7	......	......	18	
	15	42	42	144	9/16	1174	144	9/16	1174	.73	3.7	......	......	18	
	16	42	42	144	9/16	1174	144	9/16	1174	.73	3.7	......	......	18	
Frankford High Service	1	16	16	36	½	205	36	½	205	1.3	3.4	71	163.8	*23	140.8
	2	16	16	......	½	......	......	½	......	......	......	71	163.8	*23	140.8
Fairmount	1	18	16	2	......	240	2	......	240	0.88	2.11				
	3	22½	36	6	......	528	1	2	441	0.90	1.44				
	4	22½	36	6	......	528	1	2	441	0.86	1.37	56	130	......	130
	5	22½	36	6	......	528	1	2	441	0.86	1.37	56	130	......	130
	7	20	30	20	2	264	1	2	264	1.04	2.29	56	130	......	130
	8	20	30	20	2	264	1	2	264	1.04	2.29	56	130	......	130
	9	20	30	20	2	264	1	2	264	1.04	2.29	56	130	......	130
Upper Roxborough Filters	1	12	12												
Upper Roxborough Filters	2	12	12												
Upper Roxborough Filters	3	12	12												
	4	6	6												
Torresdale Filters	1	2x30	36	......	......	......	......	......	......	......	......	......	......	......	45
	2	2x30	36	......	......	......	......	......	......	......	......	......	......	......	5
	3	2x30	36	......	......	......	......	......	......	......	......	......	......	......	45
	4	2x30	36	......	......	......	......	......	......	......	......	......	......	......	45
	5	2x30	36	......	......	......	......	......	......	......	......	......	......	......	45
	6	2x30	36	......	......	......	......	......	......	......	......	......	......	......	45
	7	2x30	36	......	......	......	......	......	......	......	......	......	......	......	45
	8	2x24	2x24												

---

*Note—These pumps receive water from Reservoirs and the figures given represent the number of feet on the suction end of the pump.

† 3 per cent. for slip.

‡ 2½ per cent. for slip.

§ No slip.

PUMPAGE DIAGRAM FOR THE YEAR 1910.

APPENDIX C

REPORT

OF THE

ASSISTANT IN CHARGE OF DISTRIBUTION

Philadelphia, January 1, 1911.

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

SIR:—I have the honor to submit the following report on the distribution system for the year 1910:

Mains.

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

New Work.

	Feet.
Service mains laid	125,819
Supply mains laid	3,988
Pumping mains laid	.....
Connections, etc.	7,435
Total	137,242

Comparison of Conditions Relative to the Distribution, 1909-1910.

	1910.	1909.	Increase.	Decrease.
Service mains, 4 inches to 16 inches	125,819	125,195	624	
Supply mains, 16 inches to 48 inches	3,988	4,853		865
Pumping mains, 12 inches to 48 inches		109		109
Connections and miscellaneous work	7,435	7,022	413	
Totals in feet	137,242	137,179	1,037	974

Of the 125,819 feet of service mains laid, 50,599 feet were laid by the City, for which $1.00 per foot was charged against each property owner fronting thereon, and 75,220 feet were laid by private contract under Ordinance of 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.	1909.	Increase.	Decrease.
Relaid, 3 inches to 30 inches	4,630	11,170		6,540
Miscellaneous repairs, 3 inches to 48 inches	4,592	3,977	615	
Taken up, 3 inches to 48 inches	3,221	8,326		5,105
Lowered, raised and shifted, 4 inches to 48 inches	2,908	7,345		4,437
Totals in feet	15,351	30,818	615	16,082
Pipe cut off and abandoned, 3 inches to 20 inches	4,287	4,631		344

Repairs.

	Feet.	Feet.
Mains relaid	4,630	
Repairs and connections	4,592	
		9,222
Old pipe taken up	3,221	
Pipe lowered, raised and shifted	2,908	
		6,129
Total		15,351

Abandoned.

	Feet.
Three inch	37
Four inch	1,507
Six inch	1,984
Eight inch	505
Twelve inch	254
Total	4,287

The total quantity of pipe handled for all purposes throughout the year was 152,593 feet, weighing 6,372,385 pounds.

The total quantity of new pipe laid was 134,364 feet, 25.45 miles, making, in addition to that previously laid, 1,637.60 miles now in use.

Fire Hydrants.

New style fire hydrants in new locations	775
New style fire hydrants in place of old style	407
Total	1,182
New style fire hydrants taken out	47
Old style fire hydrants taken out	1
Total	48

The total number of new style fire hydrants added to the distribution system was 727, and the total number in use December 31, 1910, was 16,288, of which 365 are of the old style, and 15,923, or 97.7 per cent., of the new pattern. Of this latter number, 694 are installed on the High Pressure Fire Service System.

Drills for Attachments.

	Number of openings.	Area, square inches.
One-half inch	8,920	1,750
Five-eighths inch	548	168
Three-quarters inch	145	64
One inch	103	81
One and one-quarter inch	24	29
One and one-half inch	42	74
Two inches	66	207
Three inches	12	85
Four inches	12	151
Six inches	15	424
Totals	9,887	3,033

Tabulations of work performed and of expenditures made are also submitted herewith, together with various other tables, complied 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 1910.

First District.

Comprising the 1st, 2nd, 3rd, 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	
New pipe or feet added.	Service mains				5,951	60	408	478	6,897
	Fire hydrant connections				898	813			1,711
	Supply connections (private)		18	116	11				145
	Total	Feet	18	116	6,860	873	408	478	8,753
		Pounds	270	2,320	226,380	36,666	22,440	35,850	323,926
Pipe used, but adding nothing to feet in ground.	Pipe relaid				16	408			424
	Repairs, general			3	161	13	30		207
	Pipe taken up			15	14				29
	Pipe raised						110		110
	Total	Feet		18	191	421	140		770
		Pounds		360	6,303	17,682	7,700		32,045
Total handled		Feet	18	134	7,051	1,294	548	478	9,523
		Pounds	270	2,680	232,683	54,348	30,140	35,850	355,971
Pipe cut off and abandoned				27	519				546

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. 3	4	6	8	10	Total in feet and pounds.
New pipe or feet added.	Service mains				411			411
	Fire hydrant connections				125			125
	Fire connections (private)				36			36
	Supply connections (private)		202	68				270
	Total	Feet	202	68	572			842
		Pounds	3,030	1,360	18,876			23,266
Pipe used, but adding nothing to feet in ground.	Pipe relaid			21		501		522
	Repairs, general		2	21	433	3	30	489
	Pipe taken up				518			518
	Total	Feet	2	42	951	504	30	1,529
		Pounds	30	840	31,383	21,168	1,650	55,071
Total handled		Feet	204	110	1,523	504	30	2,371
		Pounds	3,060	2,200	50,259	21,168	1,650	78,337
Pipe cut off and abandoned			13	25	1,196	8		1,242

Third District.

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

	Purposes for which used.	Size in inches.								Total in feet and pounds.
		3	4	6	8	10	12	18	30	
New pipe or feet added.	Service mains		263	19,175	7,236	1,464	2,644			30,782
	Service main connections			56	61	86				203
	Supply main connections			20			5			25
	Fire hydrant connections			1,126						1,126
	Fire connections (private)	11	26	106						143
	Supply connections (private)	48	12	122						182
	Total—Feet	59	301	20,605	7,297	1,550	2,649			32,461
	Total—Pounds	885	6,020	679,965	306,474	85,250	198,675			1,277,269
Pipe used, but adding nothing to feet in ground.	Pipe relaid			135	150	50	128			463
	Repairs, general			426	32	9	32	7	26	532
	Pipe taken up		6	739	25					770
	Pipe raised			110						110
	Total—Feet		6	1,410	207	59	160	7	26	1,875
	Total—Pounds		120	46,530	8,694	3,245	12,000	910	8,580	80,079
Total handled		Feet	59	307	22,015	7,504	1,609	2,809	7	26	34,336
		Pounds	885	6,140	726,495	315,168	88,495	210,675	910	8,580	1,357,348
Pipe cut off and abandoned				125	111	475					711

Fourth District.

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

	Purposes for which used.		Size in inches. 3	4	6	8	10	12	Total in feet and pounds.
New pipe or feet added.	Service mains				7,207	516		655	8,378
	Fire hydrant connections				270				270
	Fire connections (private)		12	37	82				131
	Supply connections (private)		18	49	3				70
	Total	Feet	30	86	7,562	516		655	8,849
		Pounds	450	1,720	249,546	21,672		49,125	322,513
Pipe used, but adding nothing to feet in ground.	Pipe relaid				976	30		119	1,125
	Repairs, general			12	943	5	8	10	978
	Pipe taken up			970	147	9			1,126
	Pipe lowered				320				320
	Total	Feet		982	2,386	44	8	129	3,549
		Pounds		19,649	78,738	1,848	440	9,675	110,341
Total handled		Feet	30	1,068	9,948	560	8	784	12,398
		Pounds	450	21,360	328,284	23,520	440	58,800	432,854
Pipe cut off and abandoned				15	51				66

Fifth District.

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

	Purposes for which used.		Size in inches.						Total in feet and pounds.
			4	6	8	10	30	36	
New pipe or feet added.	Service mains			4,203	602	1,352			6,157
	Service main connections				24				24
	Fire hydrant connections			136					136
	Drains				140				140
	Total	Feet		4,339	766	1,352			6,457
		Pounds		143,187	32,172	74,360			249,719
Pipe used, but adding nothing to feet in ground.	Repairs, general			42	52	5	69	2	170
	Pipe lowered			435			150		585
	Total	Feet		477	52	5	219	2	755
		Pounds		15,741	2,184	275	72,270	840	91,310
Total handled		Feet		4,816	818	1,357	219	2	7,212
		Pounds		158,928	34,356	74,635	72,270	840	341,029
Pipe cut off and abandoned			12	20					32

Sixth District.

Comprising the 22nd and part of the 33rd, 37th, 38th and 42nd Wards.

	Purposes for which used.	Size in inches. 4	6	8	10	12	16	20	Total in feet and pounds.
New pipe or feet added.	Service mains		27,782	5,434	877	6,153			40,246
	Supply mains						3,988		3,988
	Service main connections		9			18			27
	Supply main connections		35		50				85
	By-pass connections						79		79
	Fire hydrant connections		1,317						1,317
	Fire connections (private)		24	21					45
	Supply connections (private)		31						31
	Drains		18						18
	Total—Feet		29,216	5,455	927	6,171	4,067		45,836
	Total—Pounds		964,128	229,110	50,985	462,825	467,705		2,174,753
Pipe used, but adding nothing to feet in ground.	Pipe relaid	72	74	21		1,885			2,052
	Repairs, general	8	1,643	10	15	85		6	1,767
	Pipe taken up	67	102		26	510			705
	Pipe lowered		847			936			1,783
	Total—Feet	147	2,666	31	41	3,416		6	6,307
	Total—Pounds	2,940	87,978	1,302	2,255	256,200		930	351,605
Total handled		147	31,882	5,486	968	9,587	4,067	6	52,143
		2,940	1,052,106	230,412	53,240	719,025	467,705	930	2,526,358
Pipe cut off and abandoned		1,272	37	22		254			1,585

Seventh District.

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

	Purposes for which used.		Size in inches. 3	4	6	8	10	12	Total in feet and pounds.
New pipe or feet added.	Service mains				24,976	4,522	2,359	1,091	32,948
	Service main connections							5	5
	Fire hydrant connections				1,001				1,001
	Fire connections (private)				39				39
	Supply connections (private)		26	25					51
	Total	Feet	26	25	26,016	4,522	2,359	1,096	34,044
		Pounds	390	500	858,528	189,924	129,745	82,200	1,261,287
Pipe used, but adding nothing to feet in ground.	Pipe relaid		21		23				44
	Repairs, general			5	347	52	41	4	449
	Pipe taken up			44	29				73
	Total	Feet	21	49	399	52	41	4	566
		Pounds	315	980	13,167	2,184	2,255	300	19,201
Total handled		Feet	47	74	26,415	4,574	2,400	1,100	34,610
		Pounds	705	1,480	871,695	192,108	132,000	82,500	1,280,488
Pipe cut off and abandoned			24	31	50				105

Total Feet of Pipe in Use December, 31, 1910.

Size in inches.	Total in use December 31, 1909.	Extensions and relays during 1910.			Deductions during 1910.			Total in use December 31, 1910.
		Laid.	Relaid.	Total.	Taken up.	Abandoned.	Total.	
1	175							175
1½	3,566							3,566
2	3,655							3,655
3	77,060	335	21	356		37	37	77,379
4	161,927	596	93	689	1,102	1,507	2,609	160,007
6	5,728,697	95,170	1,224	96,394	1,549	1,984	3,533	5,821,558
8	392,108	19,429	1,110	20,539	34	505	539	412,108
10	534,985	6,596	50	6,646	26		26	541,605
12	527,996	11,049	2,132	13,181	510	254	764	540,413
16	193,880	4,067		4,067				197,947
18	16,044							16,044
20	281,805							281,805
22	1,084							1,084
23	27							27
24	20,613							20,613
30	298,380							298,380
36	102,068							102,068
48	210,245							210,245
60	9,500							9,500
Total	8,563,815	137,242	4,630	141,872	3,221	4,287	7,508	8,698,179

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	18	20	30	36	
New pipe or feet added.	Service mains		263	89,705	18,370	6,460	11,021						125,819
	Supply mains							3,988					3,988
	Service main connections			65	85	86	23						259
	Supply main connections			55		50	5						110
	By-pass connections							79					79
	Fire hydrant connections			4,873	813								5,686
	Fire connections (private)	23	63	287	21								394
	Supply connections (priv'e)	312	270	167									749
	Drains			18	140								158
	Total—Feet	335	596	95,170	19,429	6,596	11,049	4,067					137,242
	Total—Pounds	5,025	11,920	3,140,610	816,018	362,780	828,675	467,705					5,632,733
Pipe used, but adding nothing to feet in ground.	Pipe relaid	21	93	1,224	1,110	50	2,132						4,630
	Repairs, general	2	49	3,995	167	138	131		7	6	95	2	4,592
	Pipe taken up		1,102	1,549	34	26	510						3,221
	Pipe lowered			1,602			926				150		2,688
	Pipe raised			110		110							220
	Total—Feet	23	1,244	8,480	1,311	324	3,709		7	6	245	2	15,351
	Total—Pounds	345	24,880	279,840	55,062	17,820	278,175		910	930	80,850	840	739,652
	Total handled—Feet	358	1,840	103,650	20,740	6,920	14,758	4,067	7	6	245	2	152,593
	Total handled—Pounds	5,370	36,800	3,420,450	871,080	380,600	1,106,850	467,705	910	930	80,850	840	6,372,385
	Pipe cut off and abandoned	37	1,507	1,984	505		254						4,287

Recapitulation by Districts.

	Districts.		Size in inches. 3	4	6	8	10	12	16	18	20	30	36	Feet.	Pounds.
New pipe or feet added.	First		18	116	6,860	873	408	478						8,753	323,926
	Second		202	68	572									842	23,266
	Third		59	301	20,605	7,297	1,550	2,649						32,461	1,277,269
	Fourth		30	86	7,562	516		655						8,849	322,513
	Fifth				4,339	766	1,352							6,457	249,719
	Sixth				29,216	5,455	927	6,171	4,067					45,836	2,174,753
	Seventh		26	25	26,016	4,522	2,359	1,096						34,044	1,261,287
	Total	Feet	335	596	95,170	19,429	6,596	11,049	4,067					137,242	
		Pounds	5,025	11,920	3,140,610	816,018	262,780	828,675	467,705						5,632,733
Pipe used, but adding nothing to feet in ground.	First			18	191	421	140							770	32,045
	Second		2	42	951	504	30							1,529	55,071
	Third			6	1,410	207	59	130		7		26		1,875	80,079
	Fourth			982	2,386	44	8	129						3,549	110,341
	Fifth				477	52	5					219	2	755	91,310
	Sixth			147	2,666	31	41	3,416			6			6,307	351,605
	Seventh		21	49	399	52	41	4						566	19,201
	Total	Feet	23	1,244	8,480	1,311	324	3,709		7	6	245	2	15,351	
		Pounds	345	24,880	279,840	55,062	17,820	278,175		910	930	80,850	840		739,652
Total handled		Feet	358	1,840	103,650	20,740	6,920	14,758	4,067	7	6	245	2	152,593	
		Pounds	5,370	36,800	3,420,450	871,080	380,600	1,106,850	467,705	910	930	80,850	840		6,372,385
Pipe cut off and abandoned			37	1,507	1,984	505		254							4,287

Recapitulation of Fire Hydrants Set, Renewed and Removed.

	Districts.	Style.					Total.
		O. S.	No. 1.	No. 2.	No. 3.	High pressure.	
Set.	First		27	6			33
	Second		12	1		85	98
	Third		84	2		289	375
	Fourth		15	4		79	98
	Fifth		11				11
	Sixth		89	1			90
	Seventh		56	14			70
	Total		294	28		453	775
Renewed.	First		1				1
	Second		76	26			102
	Third		63	53			116
	Fourth		41	15	1		57
	Fifth		9				9
	Sixth		42	4			46
	Seventh		72	4			76
	Total		304	102	1		407
Total new fire hydrants							1,182
Removed.	First		6				6
	Second		8	4			12
	Third		11	1			12
	Fourth		2	2			4
	Fifth		2				2
	Sixth		6				6
	Seventh	1	5				6
	Total	1	40	7			48
Total added during 1910							727

Fire Hydrants by Wards.

Wards.	Style.							Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	High pressure.	
First	1	201	67	8				277
Second	1	134	90	15				240
Third	3	82	44	6				135
Fourth	1	67	37	14				119
Fifth	15	114	56	4			29	218
Sixth	8	104	37	5			79	233
Seventh	5	156	75	6				242
Eighth	9	143	82	3		1	35	273
Ninth		152	60	3		1	60	276
Tenth		120	58			4	43	225
Eleventh	4	80	21	1			5	111
Twelfth	7	73	18	4				102
Thirteenth	23	85	49	7				164
Fourteenth		105	74				21	200
Fifteenth		239	206	5	1	2	13	466
Sixteenth	2	92	30	3	1			128
Seventeenth	11	98	20	1			33	163
Eighteenth	12	213	59	9				293
Nineteenth	31	346	115	7			189	688
Twentieth	16	143	125	2			27	313
Twenty-first	35	440	38	7			21	541
Twenty-second	51	1,282	47	19				1,506
Twenty-third	37	378	79	7				501
Twenty-fourth	16	345	150	8				519
Twenty-fifth		302	63	2			8	375
Twenty-sixth	1	237	123	14				375
Twenty-seventh	5	195	64	6		1		271
Twenty-eighth		176	133	28				337
Twenty-ninth		115	108	5		1		229
Thirtieth	5	139	110	6				251
Thirty-first		259	66	6			1	332
Thirty-second	5	139	96	7		1	13	261

Fire Hydrants by Wards—Continued.

Wards.	Style.							Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	High pressure.	
Thirty-third	15	492	118	10	1		69	705
Thirty-fourth	6	456	35	5		1		503
Thirty-fifth		190	24	5				219
Thirty-sixth	5	376	102	28				511
Thirty-seventh	2	115	74	4			22	217
Thirty-eighth	9	527	112	10				658
Thirty-ninth		259	90	7				356
Fortieth	7	364	60	2				433
Forty-first		63	9	10				82
Forty-second		331	13	9				353
Forty-third	7	367	54	6			15	449
Forty-fourth	6	246	64	9				325
Forty-fifth		343	71	4			7	425
Forty-sixth		382	67	15				464
Forty-seventh	4	110	105	1			4	224
Totals	365	11,373	3,498	343	3	12	694	16,288

Fire Hydrants by Purveyors' Districts.

Districts.	Style.							Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	High pressure.	
First	14	1,496	694	101				2,305
Second	77	1,333	576	40	1	6	326	2,359
Third	104	2,866	625	64	1		289	3,949
Fourth	27	1,172	965	46	1	4	79	2,234
Fifth	37	565	38	8				648
Sixth	66	1,953	220	39				2,278
Seventh	40	1,988	440	45		2		2,515
Totals	365	11,373	3,498	343	3	12	694	16,288

Statement of the Number of Fire Hydrants, by Districts and Wards, During 1910, and Total Previous Thereto.

	First District.									Second District.												Third District.												Fourth District.									Fifth District.			Sixth District.						Seventh District.							Totals.
	Wards.								Total.	Wards.											Total.	Wards.											Total.	Wards.									Total.	Wards.		Total.	Wards.					Total.	Wards.						Total.	
	1	2	3	4	26	30	36	39		5	6	7	8	9	10	11	12	13	14	16	17		18	19	23	25	31	33	35	41	42	43	45		15	20	28	29	32	37	38	47		21	38		22	37	38	42	43		24	27	34	40	44	46		
Prior to 1910									2,278												2,273											3,586								2,140			639					2,194						2,451	15,561
During 1910			2	6			15	10	33	2	1		2	2	7	6		1	23	21	33	98		191	12	10	2	94	14	2	16	18	16	375	14	28	3		14	22	12	5	98	9	2	11	35	1	7	27	20	90	2	2	16	20	5	25	70	775
Total									2,311												2,371											3,961								2,238			650					2,284						2,521	16,336
Taken out, 1910				1	3		1	1	6	2	1		1	3	1	1		1	2			12		3	1	3	1	2		1			1	12	2	2							4	2		2	1		4	1		6	2		1	1	1	1	6	48
Total in City									2,305												2,359											3,949								2,234			648					2,278						2,515	16,288

Number of attachments for fire purposes previously reported		1,009
Made during 1910	First District	
	Second District	3
	Third District	10
	Fourth District	8
	Fifth District	
	Sixth District	3
	Seventh District	1
		1,034

Attachments, Etc., Made by the Purveyors in Accordance with Permits Issued by the Bureau of Water, Arranged by Districts.

Districts.	New attachments.											Shut off by permit.							Work done without permit.				
	Size.															Repairs.			Drawn.				
	½-inch.	⅝-inch.	¾-inch.	1-inch.	1¼-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Reamed for larger attachments.	Redriven.	Discontinued.	Transfer.	Not drawn.	Drawn and redriven.	Total.	Discontinued and abandoned.	Delinquent.	Leak.	Total.	Drawn and redriven.
First	931	49	25	14	1	3	2	1	3	1	1,080	32	189	41	------	------	46	308	20	------	230	250	
Second	168	37	10	33	7	6	12	----	----	----	293	43	45	120	1	------	137	346	20	4	201	225	
Third	1,606	21	14	17	1	5	26	5	2	7	1,704	------	196	34	9	------	------	239	74	7	290	371	
Fourth	929	70	8	12	5	7	4	3	6	4	1,048	49	145	------	------	------	71	265	50	------	120	170	
Fifth	130	13	6	2	----	----	2	----	----	----	153	3	1	------	5	18	14	41	8	2	2	12	
Sixth	2,070	135	27	12	4	5	7	----	----	2	2,272	24	83	32	------	19	1	159	----	5	85	90	
Seventh	3,086	212	35	13	6	16	13	3	1	1	3,387	39	------	21	1	------	112	173	14	------	72	86	
Totals	8,920	548	145	103	24	42	66	12	12	15	9,887	190	659	248	16	37	381	1,531	186	18	1,000	1,204	

Repairs to Mains, Stops and Fire Hydrants, also Stops and Fire Hydrants Removed During 1910.

Districts.	Repairs to mains.	Stops.			Fire hydrants.		
		Repaired.	Renewed.	Removed.	Repaired.	Renewed.	Removed.
First	62	277	1	1	1,304	1	6
Second	156	554	11	25	366	102	12
Third	38	261	21	10	143	116	12
Fourth	156	554	12	10	366	57	4
Fifth	50	64	2	1	20	9	2
Sixth	54	27	5	13	11	46	6
Seventh	59	287	4	9	186	76	6
Totals	575	2,024	56	69	2,396	407	48

Total Number of Valves and Check Valves in the City, Arranged by Districts.

Pattern.	Size.	Outlets.	Districts.							Totals.
			1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	
	3″	2-way	2	186	4	25	2	19	13	251
	4″	2-way	113	256	70	163	52	88	88	830
	6″	2-way	4,039	2,626	5,159	3,393	820	3,029	3,998	23,064
	8″	2-way	189	135	269	131	15	109	407	1,255
	10″	2-way	262	459	373	247	39	231	270	1,881
	12″	2-way	150	230	363	177	51	293	227	1,491
Single Gate	16″	2-way	38	50	71	21	5	49	38	272
Bureau of Water	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--		4,829	3,995	6,379	4,260	1,028	3,839	5,085	29,415
	20″	2-way	------	1	5	8	4	4	5	27
	30″	2-way	2	2	7	7	9	2	4	33
Butterfly	36″	2-way	------	------	5	17	2	------	------	24
Bureau of Water	48″	2-way	------	2	7	31	22	------	1	63
	Totals--		2	5	24	63	37	6	10	147
	6″	4-way	3	3	------	12	------	------	12	30
	8″	4-way	------	------	------	5	------	------	------	5
Barton	6″	5-way	12	21	------	------	------	------	------	33
	6″	6-way	------	1	------	------	------	------	1	2
	Totals--		15	25	------	17	------	------	13	70

Total Number of 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	------	------	------	------	------	------	5	5
	10″	3-way	------	------	------	3	------	------	------	3
	12″	3-way	------	1	------	3	------	------	1	5
	6″	4-way	22	25	18	92	4	8	7	176
	8″	4-way	1	------	1	------	------	------	4	6
	10″	4-way	------	------	------	12	------	------	------	12
	12″	4-way	------	------	------	------	------	1	------	1
	6″	5-way	24	5	1	26	------	------	2	58
		Totals	94	82	44	361	8	17	22	628
Smith Patent	3″	2-way	3	53	4	13	------	------	11	84
	4″	2-way	5	56	3	14	------	------	5	83
	6″	2-way	4	100	24	47	15	24	26	250
	8″	2-way	1	1	13	2	2	3	------	22
	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	231	82	78	20	43	59	531
Ludlow	3″	2-way	------	------	18	1	------	2	22	43
	4″	2-way	------	------	------	1	------	------	------	1
	6″	2-way	------	------	------	------	5	------	16	21
		Totals	------	------	18	2	5	2	38	65

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	85
	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

Total Number of Valves and Check Valves—Continued.

Pattern.	Size.	Outlets.	Districts. 1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	Totals.
Pratt and 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	3	8	1	------	------	------	14
Van Winkle	3″	2-way	------	3	------	------	------	------	------	3
Water Equipment Company	20″	2-way	1	------	------	------	------	------	------	1
Electric, Kennedy	20″	2-way	------	------	1	------	------	------	------	1
High pressure valves.	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			1,168	3,995	5,303	4,963	4,829	6,600	4,825	31,683
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 1909 and 1910.

Months.	Hydrants.		Service pipes.		Wash paves.		Spigots.		Water closets.		Horse troughs.		No. leaks.		Totals.	
	1909	1910	1909	1910	1909	1910	1909	1910	1909	1910	1909	1910	1909	1910	1909	1910
January	159	133	145	236	2	1	52	50	49	75	1	2	5	3	417	500
February	170	168	200	210	5	7	74	75	116	120	2		7	1	574	581
March	128	185	172	224	4	3	38	51	79	60			3	2	424	525
April	138	146	140	156	4	5	40	27	61	50		1	14	4	397	389
May	179	177	220	180	8	10	70	80	101	100	2	1	10	11	590	559
June	220	200	184	185	6	3	71	70	106	111	3	2	4	4	591	575
July	217	210	175	165	7	7	95	100	103	119	6	4	4		607	605
August	208	200	212	211	4	5	78	67	120	80	6	2	7	5	635	570
September	213	200	166	175	10	9	96	100	77	70	11	4	12	7	584	565
October	232	250	197	201	7	12	88	70	103	90	6	8	1	1	634	632
November	251	225	211	215	5	7	79	60	123	141	4	3	8	3	680	654
December	275	190	200	175	5	4	50	35	130	113	5	5	10	8	675	530
Totals	2,390	2,284	2,222	2,333	67	73	831	785	1,163	1,129	46	32	85	49	6,809	6,685

Schedule of Pipe and Castings Inspected During 1910.

	Manufacturer.	Size in inches.		Inspected.	Rejected.	Accepted.
		Pipe.	Special castings.			
Bureau of Water.	Donaldson Iron Company, Emaus, Pa	4 in		150	29	121
	Donaldson Iron Company, Emaus, Pa	6 in		4,541	1,332	3,209
	Donaldson Iron Company, Emaus, Pa	8 in		2,127	370	1,757
	Donaldson Iron Company, Emaus, Pa	10 in		395	87	308
	Donaldson Iron Company, Emaus, Pa	12 in		1,906	329	1,577
	Donaldson Iron Company, Emaus, Pa	20 in		10		10
	Donaldson Iron Company, Emaus, Pa		4 inches to 30 inches	4,044	838	3,206
	Standard Pipe and Foundry Company, Bristol, Pa	8 in		251	23	228
	M. P. Quinn, Bristol, Pa	16 in		625	125	500
	M. P. Quinn, Burlington, N. J	30 in		10		10
	J. A. Clark, Philadelphia, Pa		Frames and covers	734	34	700
	J. A. Clark, Philadelphia, Pa		Meter frames	223	23	200
	J. A. Clark, Philadelphia, Pa		Stop boxes	323	23	300
	J. A. Clark, Philadelphia, Pa		Floor grating	117	11	106
	J. A. Clark, Philadelphia, Pa		Grate bars	320	20	300
	Totals			15,776	3,244	12,532

Schedule of Pipe and Castings Inspected During 1910—Continued.

	Manufacturer.	Size in inches.		Inspected.	Rejected.	Accepted.
		Pipe.	Special castings.			
Contract No. 173W.	U. S. C. I. Company, Addyston, Ohio	*12 in.		230	38	192
	U. S. C. I. Company, Addyston, Ohio		Flange, 6 inches to 12 inches	294	72	222
	Pennsylvania Steel Company, Chester, Pa		6 inches to 12 inches	13		13
	Totals			537	110	427
Contract No. 154.	Millard Construction Company, Weatherby, Pa		Flange	698	103	595
	Millard Construction Company, Weatherby, Pa			246	78	168
	Millard Construction Company, Mt. Carmel, Pa		Flange	63	12	51
	Millard Construction Company, Berwick, Pa		Flange	284	121	163
	Millard Construction Company, Burlington, N. J.	48 in.		11	1	10
	Millard Construction Company, Burlington, N. J.		48 inches	4		4
	Totals			1,306	315	991

*Flanged.

Schedule of Pipe and Castings Inspected During 1910—Continued.

	Manufacturer.	Size in inches.		Inspected.	Rejected.	Accepted.
		Pipe.	Special castings.			
Bureau of Surveys.	Costello Company, Camden, N. J.	*12 in.		17	8	9
	Costello Company, Camden, N. J.	*14 in.		14	9	5
	Costello Company, Camden, N. J.	*18 in.		10	3	7
	Costello Company, Camden, N. J.	14 in.		397	105	292
	Costello Company, Camden, N. J.	20 in.		6	2	4
	Costello Company, Camden, N. J.	24 in.		2		2
	Costello Company, Camden, N. J.		6 inches to 24 inches	36	6	30
	Costello Company, Camden, N. J.		Flange, 6 inches to 24 inches	47	7	40
	Totals			529	140	389

*Flanged.

Schedule of Pipe and Castings Inspected During 1910—Continued.

	Manufacturer.	Size in inches.		Inspected.	Rejected.	Accepted.
		Pipe.	Special castings.			
Contractors.	Donaldson Iron Company, Emaus, Pa	6 in		3,270	998	2,272
	Donaldson Iron Company, Emaus, Pa	8 in		1,162	258	904
	Donaldson Iron Company, Emaus, Pa	10 in		248	74	174
	Donaldson Iron Company, Emaus, Pa	12 in		67	15	52
	Donaldson Iron Company, Emaus, Pa		6 inches by 12 inches	254	41	213
	R. D. Wood, Florence, N. J	6 in		2,596	1,163	1,433
	R. D. Wood, Florence, N. J	8 in		949	707	242
	R. D. Wood, Florence, N. J		6 inches to 12 inches	206	55	151
	Totals			8,752	3,311	5,441
Bureau of Correction	Donaldson Iron Company, Emaus, Pa	6 in		936	254	682
	Donaldson Iron Company, Emaus, Pa		6 inches to 12 inches	15		15
	Totals			951	254	697

DISTRIBUTION EXPENSES DURING THE YEAR 1910.

Including Expenses of Main Office, Purveyors' Districts and Meter Shops.

Material and Labor	First District	Second District	Third District	Fourth District	Fifth District	Sixth District	Seventh District	Distribution	Meter Shops	Main Office	Totals
Lead	$811 57	$543 56	$2,704 43	$2,430 70	$809 95	$1,352 38	$2,162 70				$10,815 29
Gasket	23 03			62 05	86 50	43 75	22 75				238 08
Coke	21 60	54 00	65 00	43 00	57 38	101 25					347 23
Wood		7 50									7 50
Straight pipe								65,877 28			65,877 28
Small specials								7,623 28			7,623 28
Large specials								647 94			647 94
Stop boxes		790 37	332 21	653 14			1,050 72				2,826 44
Frames and covers	115 33	160 48	657 73	980 10		401 20	485 02		3,681 65		6,481 51
Hauling								1,416 52			1,416 52
Transportation and hotel								3,922 58			3,922 58
Supplies, tools, small stores, etc.	978 21	961 19	659 52	832 00	604 71	1,221 13	650 70	520 90	351 22	82 65	6,862 23
Plumbing and plumbing supplies					17 46	65 55					83 01
Meters, etc.									828 89		828 89
Brick, stone, lime and cement	37 53	558 63	80 30	41 25	44 50	57 85	178 25				998 31
Lumber	5,883 42	80 00	545 32	238 40	269 04	319 84	153 44	145 46	565 74		8,250 66
Hay, feed, etc	770 08	1,333 49	1,456 61	1,179 45	449 84	769 44	901 48				6,860 39

Distribution Expenses during the Year 1910—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 supplies	$468 89	$257 84	$167 16	$91 44	$249 31	$392 09	$256 65				$1,883 38
Stable repairs	326 05	255 10	128 50	118 40	44 00	82 75	187 75				1,142 50
Stable medicines	16 00	31 50	27 75		13 50	25 09	43 00				156 84
Stable shoeing	175 09	363 25	389 05	174 35	89 50	194 00	105 90				1,482 14
Supplies, stationery	17 53	29 87	14 41	16 35	6 74	9 58	16 26	369 58	74 10	11 25	565 67
Wages—Per diem	22,089 41	29,794 70	62,381 35	22,345 44	18,786 35	36,984 49	20,119 05				212,500 79
Wages—Salary	5,242 81	5,270 00	7,044 61	9,286 02	3 332 30	5,263 20	5,181 58				40,620 52
Total cost of labor and material on account of distribution	$36,976 55	$40,491 48	$76,653 95	$38,547 09	$24,852 08	$47,283 54	$31,515 25	$80,523 54	$5,501 60	$93 90	$382,438 98
Buildings, grounds and reservoirs			$3,188 27	$2,263 23	$8,339 16	$2,380 31	$9,363 19				$25,534 16
High pressure fire service			108 75								108 75
Repair shop	$57 50										57 50
Bureau of Highways				113 50			447 76				561 26
Reading meters	786 75										786 75
Meter shop				28 20							28 20
Court witnesses			26 00								26 00
Total labor and material	$37,820 80	$40,491 48	$79,976 97	$40,952 02	$33,191 24	$49,663 85	$41,326 20	$80,523 54	$5,501 60	$93 90	$409,541 60

APPENDIX D

REPORT OF THE REGISTRAR

Philadelphia, January 19, 1911.

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

SIR:—I herewith submit Annual Report of the operations of this Department for year ending December 31st, 1910.

The receipts from all sources for the year 1910 are as follows:

I. Collected by Water Rent Tax Office, Receiver of Taxes	$4,541,468 89
II. Collected for fees for searches, Miscellaneous Tax Office, Receiver of Taxes	2,557 50
III. Collected by City Solicitor for water pipe frontage	32,331 26
IV. Collected by City Solicitor for miscellaneous work done by the Bureau of Water	75 97
V. Collected by Department of Supplies for Bureau of Water	884 03
VI. Collected by Bureau of Highways for ferrules delivered by the Bureau of water	9,567 00
Total	$4,586,884 65

The revenue received by the Water Rent Tax Office for 1910, as compared with the receipts of 1909, shows an increase of $138,283.22.

The fees for searches received in the Miscellaneous Tax Office, Receiver of Taxes, for year 1910, show an increase of $34.00 as compared with year 1909.

The collections made by the Law Department to be credited to this Bureau for the year 1910 show a decrease of $2,457.79.

The amount received by the Department of Supplies for the sale of material shows a decrease of $3,331.46, as compared with year 1909.

The receipts of the Bureau of Highways for ferrules delivered by this Department on permits issued show an increase of $1,393.00 as compared with year 1909.

The total increase in revenue as compared with year 1909 amounts to $133,920.97.

I submit herewith detailed statements of receipts for years 1909 and 1910.

I forward herewith report of the operations of the Meter Department for year ending December 31, 1910; 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; shut offs made by permits; work done by District Purveyors without permits, including ferrules withdrawn for delinquent water rent, discontinued, leaking and abandoned ferrules; detailed accounts of permits issued for various purposes, together with the total number of premises and fixtures supplied by City water.

In closing, would state that the same standard of efficiency of the inspectors and clerks in this Department as was shown in the year 1909 has been maintained during 1910. The total number of permits issued by this Department for the year 1910 amounts to 23,128. With a corps of 23 inspectors the total number of inspections amounts to 54,382, as compared with 46,331 for year 1909.

Respectfully submitted,

JAMES F. McCRUDDEN,

Registrar.

1910.

	Water Rents Paid by Schedule on Existing Connections				On new connections	By meter current and delinquent	Charges for ferrules on new connections	Liens	Interest	Fees for Searches	Pipe frontage paid to Receiver of Taxes	Miscellaneous	Collected by City Solicitor for pipe frontage	Totals
	Rents		Penalties											
	Current	Delinquent	Current	Delinquent										
January		$15,870 84		$2,398 90	$3,107 61	$3,781 05	$294 00	$15 00	$38 48	$166 75	$2,710 17	$6,113 81	$6,520 39	$41,017 00
February	$150,643 45	4,969 16		757 79	5,610 71	44,957 56	1,202 10	16 00	31 75	170 00	2,665 45	2 56	1,304 78	212,331 31
March	310,144 21	4,535 87		688 61	13,388 07	44,707 13	2,224 00	19 00	49 53	237 00	4,343 84	167 74	1,671 03	382,176 03
April	322,039 70	3,877 94		582 18	16,680 34	18,510 15	1,599 00	51 00	98 80	256 75	4,180 22	17,742 68	3,371 18	388,989 94
May	2,527,975 98	2,117 97		302 87	20,148 42	45,617 88	1,305 00	73 00	86 22	246 00	4,133 05	6,882 20	2,408 35	2,621,256 94
June	100,253 89	2,250 00	$3,683 19	338 55	13,577 31	36,156 34	1,604 00	8 00	39 28	230 00	2,881 86	504 95	2,907 31	164,434 78
July	42,350 37	1,202 23	2,153 77	161 53	10,362 57	5,853 06	870 00	9 00	28 33	202 75	3,297 78	2,107 98	2,504 46	71,103 83
August	158,859 85	1,161 28	6,604 11	171 05	11,768 76	63,128 69	2,090 00	9 00	15 26	199 50	3,744 03	3,785 35	3 483 07	255,019 95
September	28,763 85	748 00	3,498 73	113 30	10,514 34	50,686 75	1,129 00	1 00	3 83	208 25	8,525 19	1,297 87	2,820 62	108,310 73
October	101,798 16	897 60	15,180 50	90 50	9,858 39	836 61	2 245 00	6 00	10 20	215 75	6,017 14	676 02	2,406 57	140,288 44
November	30,069 80	577 50	4,451 12	95 08	8,955 87	62,070 84	1,492 00	16 00	36 47	211 50	4,982 29	162 81	1,509 39	114,630 67
December	20,375 05	815 63	3,096 68	122 29	6,029 81	39,923 36	1,049 00	7 00	11 33	213 25	3,074 49	656 00	1,424 11	76,798 03
1910	3,803,274 31	$39,024 02	$38,668 10	$5,822 65	130,002 23	416 279 42	17,103 10	190 00	449 58	2,557 50	50,555 51	40,099 97	32,331 26	4,576,357 65
1909	3,653,427 01	37,876 96	$36,015 25	$5,573 63	137,815 09	396,016 79	24,118 00	271 00	963 62	2,523 50	104,046 54	7,061 78	34,865 02	4,440,574 19
Increase	$149,847 30	$1,147 06	$2,652 85	$249 02		$20,262 63				$34 00		$33,038 19		$135,783 46
Decrease					$7,812 86		$7,014 90	$81 00	$514 04		$53,491 03		$2,533 76	

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, 1910, with report of corresponding period of 1909:

	1909	1910	Difference
Rents	$3,653,427 01	$3,803,274 31	$149,847 30
Penalties	36,015 25	38,668 10	2,652 85
Delinquents	37,876 96	39,024 02	1,147 06
Penalties	5,573 63	5,822 65	249 02
Liens	271 00	190 00	81 00*
Interests	963 62	449 58	514 04*
Permits	161,933 09	147,105 33	14,827 76*
Meters	396,016 79	416,279 42	20,262 63
Pipe	104,046 54	50,555 51	53,491 03*
Special	7,061 78	40,099 97	33,038 19
Total	$4,403,185 67	$4,541,468 89	$138,283 22

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

	1909		1910		
	No.	Amount	No.	Amount	Difference
For additional fixtures	5,693	$12,742 51	5,253	$11,406 26	$1,336 25*
For building purposes	1,544	15,665 62	1,655	18,747 14	3,081 52
For additional water rent	2,221	44,193 76	2,206	34,910 98	9,282 78*
For Department ferrules	720	24,118 00	901	17,163 00	6,955 00*
For special permits	66	654 25	72	1,585 75	931 50
For new houses	14,365	64,558 95	11,171	63,292 20	1,266 75*
For ferrules drawn	285		339		
Totals	24,894	$161,933 09	21,597	$147,105 33	$14,827 76*

*Decrease.

Unpaid permits to December 31, 1910 equals.....		$4,770 14
Additional	$1,620 40	
New houses.....	1,126 00	
Building permits	862 74	
Department ferrules	714 00	
Fractional rent	162 00	
Special permits	285 00	
		$4,770 14

Miscellaneous Meter Operations, 1910.

SIZE OF METERS	Meters Repaired													Meters Packed												Meters Tested																	
	Crown	Gem	Nash	Union	Crest	Lambert	Hersey	Trident	Empire	Columbia	Standard	American	Total	Crown	Gem	Nash	Trident	Union	Empire	Hersey	Worthington	Columbia	Crest	Eureka	Disc	Total	Crown	Gem	Trident	Hersey	Keystone	Nash	Union	Empire	Crest	Lambert	Eureka	American	Watch Dog	Nilo	King	Worthington	Total
½-inch	2												2	3												3	2																2
⅝-inch	4			1			1	2	1	10			19				12	1	6	3		18				40	5			3	1			2					2			1	14
¾-inch	49					1		3					53	83		2	5	1	8							100	31		4		1	1			4								41
1-inch	51						5	1	6	1			64	57			2	1	6		2	1			1	69	31		5	16	18			13		1		1			2	13	100
1½-inch	30		1	1				3	6			1	42	43		1	2		4	1	1			2		54	18		1	6	1		1	5	3	1	1					3	40
2-inch	37	71		2			1	2					113	46	18		1	4	2		1		2			74	24	32	1	5					1	1	3					1	68
3-inch	17	44					1	3			3		68	7	9											16	8	25		2				1	2	1	2			1			42
4-inch	10	95					1						106	1	13					1			1			16	7	18		1							1						27
6-inch	3	31			1		4						39		1											1		15									4						19
12-inch																																											
20-inch																																											
30-inch																																											
36-inch																																											
48-inch																																											
Totals	203	241	1	4	1	1	13	14	13	11	3	1	506	240	41	3	22	7	26	5	4	19	3	2	1	373	126	90	11	33	21	1	1	21	6	8	11	1	2	1	2	18	353

Examinations			Miscellaneous					Statements
Meters	Leaks	Total	New boxes	Boxes repaired	Iron covers	Service pipes repaired	Total	
2,388	62	2,450	118	120	8	290	536	22,800

Report Meter Operations from January 1, 1910, to December 31, 1910.

In Use January 1, 1910.

SIZE OF METERS	Crown	Gem	Nash	Union	Venturi	Thomson	Hersey	Trident	Empire	Deacon	Columbia	Standard	Keystone	Niagara	Worthington	American	Total
½-inch	13		1	3													17
⅝-inch	5		3	14				75	17		154	2	2				272
¾-inch	188		9	13			1	15	17		1		1		2		247
1-inch	188		2	4			1	5	20		4				3		227
1½-inch	119		2	30			2	20	28				4		6	1	213
2-inch	153	117		11			1	9	4				2	1			297
3-inch	58	122		2		2	2	10	2								198
4-inch	46	176					2	2									226
6-inch	7	37					2	2		6		1					55
12-inch					1												1
20-inch					2												2
30-inch					1												1
36-inch					1												1
48-inch					2												2
Totals	777	452	17	77	7	2	11	138	88	6	159	3	9	1	11	1	1,759

Set during 1910.

SIZE OF METERS	Crown	Gem	Nash	Eureka	Worthington	Lambert	Hersey	Trident	Empire	Crest	Keystone	Watch Dog	American	King	Total
½-inch															
⅝-inch	5				1		3		2			1			12
¾-inch	1		1			3			1		1				7
1-inch	2				9	1	18	1	11		17		1	1	61
1½-inch				2	3	1	1	1	4	4	1				17
2-inch	5	3		3	1	1	4	1							18
3-inch	1	4		2		1	2		1	2					13
4-inch	2	8		1			1		1						13
6-inch		6		4			2								12
12-inch															
20-inch															
30-inch															
36-inch															
48-inch															
Totals	16	21	1	12	14	7	31	3	20	6	19	1	1	1	153

Renewed—Taken Out.

SIZE OF METERS	Crown	Gem	Worthington	Trident	Union	Empire	Columbia	Hersey	Standard	Eureka	Total
½-inch											
⅝-inch	2			1	1	4					8
¾-inch	34			3	2	1					40
1-inch	28						1				29
1½-inch	16		1	6	6	3		1			33
2-inch	24	26	1							1	52
3-inch	5	19			1				3		28
4-inch	8	19									27
6-inch		8									8
12-inch											
20-inch											
30-inch											
36-inch											
48-inch											
Totals	117	72	2	10	10	8	1	1	3	1	225

Renewed—Put In.

SIZE OF METERS	Crown	Gem	Trident	Hersey	Empire	Union	Nash	Keystone	Nilo	Total
½-inch										
⅝-inch	3			1	3	1				8
¾-inch	29		3		2					34
1-inch	26		1	6	4		1	1		39
1½-inch	24			3	5					32
2-inch	27	28				1				56
3-inch	7	18		1					1	27
4-inch	4	18								22
6-inch		8								8
12-inch										
20-inch										
30-inch										
36-inch										
48-inch										
Totals	120	72	4	11	14	2	1	1	1	226

Discontinued.

SIZE OF METERS	Crown	Gem	Nash	Trident	Union	Keystone	Total
½-inch					1		1
⅝-inch				1		1	2
¾-inch	4			2			6
1-inch	3						3
1½-inch	1						1
2-inch	3						3
3-inch							
4-inch		2					2
6-inch							
12-inch							
20-inch							
30-inch							
36-inch							
48-inch							
Totals	11	2		3	1	1	18

Stock on Hand.

SIZE OF METERS	Crown	Gem	Nash	Deacon	Trident	Total
½-inch						
⅝-inch	1					1
¾-inch	6				1	7
1-inch	1					1
1½-inch						
2-inch	2	3				5
3-inch	1	4				5
4-inch	2	3				5
6-inch		3				3
12-inch						
20-inch						
30-inch						
36-inch						
48-inch						
Totals	13	13			1	27

In Use December 31, 1910.

SIZE OF METERS	Crown	Gem	Nash	Deacon	Trident	Union	Empire	Hersey	Venturi	Standard	Thomson	Columbia	Keystone	Niagara	Worthington	American	Eureka	Crest	Lambert	Watch Dog	Nilo	Total
½-inch	13		1			2																16
⅝-inch	11		3		75	14	18	4		2		150	2							1		280
¾-inch	180		10		13	11	21	1				1	2		2				3			244
1-inch	182		3		7	4	35	25				3	17		12	1			1			290
1½-inch	126		2		15	24	34	5					6	1	8	1	2	4	1			229
2-inch	158	122			10	12	4	5			2		2				3		1			319
3-inch	61	125			10	1	3	5									2	2	1		1	211
4-inch	44	181			3			3									1					232
6-inch	7	43		6	2			4		1							4					67
12-inch									1													1
20-inch									2													2
30-inch									1													1
36-inch									1													1
48-inch									2													2
Totals	782	471	19	6	135	68	115	52	7	3	2	154	29	1	22	2	12	6	7	1	1	1,895

RECAPITULATION

In use, January 1, 1910	1,759		
New meters set, 1910	153	1,912	
Renewed, taken out		225	
		1,687	
Renewed, put in		226	
		1,913	
Discontinued		18	1,895

Shut Off Orders for Delinquent Water Rents, 1910:

First District	1,608
Second District	1,172
Third District	1,676
Fourth District	1,445
Fifth District	277
Sixth District	1,214
Seventh District	2,154
Total	9,546

Attachments, etc., Made by the Purveyors in Accordance with Permits Issued by the Bureau of Water.
New Attachments.

DISTRICTS	½-inch	⅝-inch	¾-inch	1-inch	1¼-inch	1½-inch	2-inch	3-inch	4-inch	6-inch	Total
First	931	49	25	14	1	3	2	1	3	1	1,030
Second	168	37	30	33	7	6	12	----	----	----	293
Third	1,606	21	14	17	1	5	26	5	2	7	1,704
Fourth	929	70	8	12	5	7	4	3	6	4	1,048
Fifth	130	13	6	2	----	----	2	----	----	----	153
Sixth	2,070	145	27	12	4	5	7	----	----	2	2,272
Seventh	3,086	213	35	13	6	16	13	3	1	1	3,387
Total	8,920	548	145	103	24	42	66	12	12	15	9,887

Attachments, etc., Made by the Purveyors in Accordance with Permits Issued by the Bureau of Water.
Shut-Offs by Permits.

DISTRICTS	Reamed for Larger Attachments	Redriven	Discontinued	Transfer	Repairs		
					Not Drawn	Drawn and Redriven	Total
First	32	189	41	--------	--------	46	308
Second	43	45	120	1	--------	137	346
Third	--------	196	34	9	--------	--------	239
Fourth	49	145	--------	--------	--------	71	265
Fifth	3	1	--------	5	18	14	41
Sixth	24	83	32	--------	19	1	159
Seventh	39	--------	21	1	--------	112	173
Total	190	659	248	16	37	381	1,531

Work Done Without Permit.

Drawn.

DISTRICTS	Discontinued and Abandoned	Delinquent	Leak	Transfer	Total
First	20		230		250
Second	20	4	201		225
Third	74	7	290		371
Fourth	50		120		170
Fifth	8	2	2		12
Sixth		5	85		90
Seventh	14		72		86
Total	186	18	1,000		1,204

Meters.

	1909	1910	Increase
Meters in use	1,759	1,895	136

Number of Dwellings and Principal Appliances for Use of City Water.

1910	1909	1910	Increase	Decrease
Dwellings with water	302,922	315,326	12,404	
Dwellings without water	11,859	11,513		348
Water closets	399,875	422,776	22,901	
Baths	346,823	357,814	10,991	
Wash paves	99,347	101,431	2,084	
Basins and sinks	167,116	178,902	11,786	
Urinals	6,717	6,819	102	

Permits Issued During the Year 1910:

Aquaria	1
Bakeries	16
Barber shop	54
Bars	5
Basins and sinks in dwellings	10,376
Basins and sinks in offices and stores	1,430
Baths in dwellings	11,056
Baths in hotels, etc	217
Baths (shower)	43
Bidets	12
Boats, etc. (supply of)	150
Bottling establishments	10
Building purposes	1,655
Carriages and wagons	241
Cellar Drainers	12
Dwellings	12,404
Dwellings (half)	12
Drug stores	25
Dye houses	15
Factories	10
Ferrules (number)	9,887
Filters	6
Fire hydrants (use of)	90
Fish troughs and stands	16
Forges	4
Fountains (counter)	112
Fountains (garden)	9
Greenhouses	14
Heating boilers	170
Hydrants in new dwellings	11,294
Hydraulic elevators	12
Ice cream saloons	15
Lawn sprinklers	57
Laundries	7
Laboratories	4
Machines for scouring and rinsing	30
Milk houses	19
Motors (beer)	6
Motors (organ)	13
Photograph galleries	2
Pantry sinks	657
Pools (swimming)	5

Pools (in churches)	2
Restaurants and eating saloons	27
Slaughter houses	6
Stables	200
Stalls (in stables)	772
Stalls (cow)	25
Steam boilers (number)	473
Steam Boilers (H. P.)	18,152
Steam engines (number)	433
Steam engines (H. P.)	631
Street sprinklers	190
Tubs, vats and tanks	40
Urinals in dwellings	5
Urinals in stores, offices etc	102
Urinals, troughs	30
Wash paves and screw nozzles	2,597
Wash paves for watering horses	34
Wash tubs (stationary)	11,836
Water closets in dwellings	19,830
Water closets in stores, etc	1,399

Premises Supplied and Appliances in Use January 1, 1911.

Aquaria	39
Arsenals	2
Asylums	7
Bakeries	1,341
Barber shops	2,085
Bars	1,953
Basins and sinks in dwellings	139,135
Basins and sinks in offices and stores	39,767
Baths in dwellings	353,417
Baths (public)	3,731
Baths (shower)	506
Baths (foot)	160
Beam houses and tanneries	50
Bidets	482
Bottling establishments	766
Brick yards	23
Brick yards (gangs of men)	855
Breweries	163
Barrels (brewed)	4,351,814
Cars (steam and electricity)	2,270

Carriages and wagons	10,538
Cellar drainers	76
Cemeteries	35
Churches	878
Coal yards	265
Coloring rooms	163
Condensers	50
Depot and railway stations	400
Dwellings (with water)	315,326
Dwellings (without water)	2,000
Dwellings (half without water)	9,286
Dyers	905
Drug stores	537
Dye houses	810
Engines (railroad)	500
Factories, foundries and mills	2,899
Filters	45
Fire stations	95
Fountains (garden)	79
Fountains (counter)	675
Forges	1,395
Furnaces	30
Gas works (holders)	10
Glass works	13
Greenhouses	1,161
Grindstones	140
Halls and club houses	300
Hatters' planks (per set)	40
Hydrants	312,152
Hospitals	337
Hotels	110
Hydraulic elevators	315
Ice cream saloons	177
Institutions	180
Ice machines	195
Laundries	780
Lawn sprinklers	334
Laboratories	50
Machines for washing and scouring	310
Marble yards	73
Malt houses	620
Market houses	65
Milk houses	591
Mint	1
Motors (beer)	2,036

Motors (organ)	289
Photograph galleries	161
Photograph galleries (operators)	195
Polishing wheels	35
Police stations and patrols	87
Pools in churches	90
Pools, swimming	25
Printing establishments	195
Prisons	4
Rectifying establishments	15
Restaurant and oyster saloons	1,228
Shot tower	1
Slaughter houses	506
Soap boiling establishments	19
Stand pipes for watering engines	90
Stables	8,645
Stalls (in stables)	57,383
Stalls (cow)	365
Stalls (fish and trough)	144
Steam boilers (number)	4,878
Steam boilers (H. P.)	178,657
Steam boilers (heating)	1,615
Steam boilers (heating H. P.)	780
Steam engines (number)	3,178
Steam engines (H. P.)	39,842
Steam saws	70
Steam presses and hammers	55
Shops and stores (with water)	7,220
Shops (without water)	960
School houses	320
Theatres	368
Tubs, vats and tanks	2,861
Turbine wheels	30
Urinals (in dwellings)	275
Urinals in stores, offices, etc	5,624
Urinal troughs	920
Vinegar establishments	20
Wash paves and screw nozzles	100,928
Wash paves for watering horses	503
Wash tubs (stationary)	90,949
Water closets in dwellings	387,802
Water closets in stores, etc	34,974
Wool washers	175
Gas engines	973

APPENDIX E

REPORT

OF THE

OPERATIONS AT THE CONSTRUCTION AND REPAIR SHOP, BUREAU OF WATER, DURING THE YEAR 1910

Philadelphia, January 18, 1911.

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

DEAR SIR:—I herewith submit the annual report of the operations at the construction and repair shop, Twelfth and Reed streets, for the year ending December 31, 1910.

Yours respectfully,

JAS. H. DEAN,
Superintendent of Shop.

Annual Report of Superintendent of Bureau of Water, Construction and Repair Shop, for the year 1910.

MERCHANDISE AND WAGES.		DR.
Inventory, January 1, 1910		$32,290 84
Iron castings	$18,148 32	
Brass castings	5,519 79	
Lead coating	417 90	
Wrought iron	1,056 65	
Steel	305 52	
Hardware	510 81	
Bolts, nuts, washers and screws	531 58	
Wrought iron pipe	31 57	
Leather, gum goods and belting	1,267 39	
Pig lead	1,082 97	
Lumber	894 50	
Coal	1,564 74	
Coke	27 00	
Oils and tallows	176 22	
Paints and oils	134 76	
Brushes and brooms	32 76	
House cleaning supplies	59 68	
Stationery, blank books and office supplies.	10 36	
Blanks and books	12 14	
Forage	156 36	
Harness and stable supplies	51 79	
Miscellaneous	322 22	
Wages	36,700 11	
		69,015 14
Total		$101,305 98

		CR.
First District	$3,277 18	
Second District	3,474 84	
Third District	9,026 11	
Fourth District	4,280 57	
Fifth District	974 53	
Sixth District	7,341 39	
Seventh District	7,393 34	
		$35,767 96
Belmont machinery	$5,001 83	
Belmont boilers	765 17	
Belmont filters	831 43	
		6,598 43

Frankford machinery	$1,639 38	
Frankford boilers	3,646 52	
		$5,285 90
Queen Lane machinery	$3,589 39	
Queen Lane boilers	297 07	
Queen Lane filters	18 50	
		3,904 96
Roxborough machinery	$6,209 05	
Roxborough boilers	906 63	
Roxborough filters	6 98	
		7,122 66
Spring Garden machinery	$90 24	
Spring Garden boilers	28 82	
		119 06
Torresdale machinery	$472 26	
Torresdale boilers	588 42	
Torresdale filters	221 41	
		1,282 09
Mt. Airy machinery	$1 82	
		1 82
General buildings and grounds	$625 78	
		625 78
General distribution	$73 17	
		73 17
High pressure fire service	$218 01	
		218 01
Fixed patterns	$984 28	
		984 28
Survey Bureau	$5 59	
		5 59
Construction and repair shop	$2,996 72	
		2,996 72
Main office	$1,748 83	
		1,748 83
Holmesburg Water Co	146 56	
		146 56
Total		$66,881 82
Inventory January 1, 1911		39,245 59
Total Cr.		$106,127 41
Total Dr.		101,305 98
Balance		$4,821 43

Inventory, January 1, 1911.	Cr.	
8 4-in. stops, complete, at $16	$128 00	
95 6-in. stops, complete, at $18.50	1,757 50	
2 6-in. stops, special, with hat flange, at $20	40 00	
9 8-in. stops, complete, at $28.50	256 50	
27 10-in. stops, complete, at $37.50	1,012 50	
1 10-in. stop, special flange, at $40	40 00	
5 12-in. stops, complete, at $48	240 00	
4 16-in. stops, complete, at $80	320 00	
2 20-in. stops, complete, at $120	240 00	
2 30-in. stops, complete, at $270	540 00	
		$4,574 50
Finished iron and brass castings for stops	1,839 45	
37,737 lbs. iron castings for stops	943 43	
1,503 lbs. brass castings for stops	255 51	
		3,038 39
51 No. 1 leather valve fire hydrants, at $34	$1,734 00	
		1,734 00
Finished iron castings for fire hydrants	$1,176 90	
Finished brass castings for fire hydrants	557 15	
80,451 lbs. iron castings for fire hydrants	2,815 59	
610 lbs. brass castings for fire hydrants	112 85	
		4,662 49
Finished and partly finished valve rods, frost rods, frost rod guides, nozzle cap chains and eye bolts	$1,136 45	
		1,136 45
326 4 in. rubber valves for fire hydrants.	$211 90	
22 6 in. rubber valves for fire hydrants.	27 50	
Leather discs to make 4 in. and 6 in. valves	249 75	
7 lbs. nozzle rings	2 45	
315 lbs. gum joint rings	110 25	
		601 85
40 lbs. listing	$10 00	
3 gross flat head brass machine screws.	9 00	
300 ft. coil chain	9 00	
650 wooden plugs, various sizes	325 00	
566 brass ferrule plugs, various sizes	215 05	
298 lbs. brass castings for ferrule plugs.	49 66	
		617 71

15 fire hydrant risers	$50 25	
6 blank flanges for goose necks	13 50	
44 wrought iron monkey legs	165 00	
13 cast iron monkey legs	22 75	
12 street keys and 6 hydrant keys	133 50	
9 tunnel bars	38 25	
6 scrapers	12 00	
		$435 25
Tools and chisels for Districts and Pumping Stations	$812 42	
21 lead pots	51 00	
8 furnaces and 14 grates	274 00	
600 lbs. gaskets	30 00	
5,525 lbs. pig lead	386 75	
		1,554 17
18,433 bolts, various sizes	$1,041 63	
2,733 set screws, various sizes	178 05	
2,716 lbs. nuts, various sizes	273 80	
1,254 lbs. washers, various sizes	125 58	
		1,619 06
22,333 lbs. iron, round, square and flat	$643 08	
16,225 lbs. steel, round, square and flat	469 83	
		1,112 91
30 quadrants	$300 00	
297 bead bands, various sizes	1,562 50	
22 bell bands, various sizes	349 00	
93 tail-ends, various sizes	118 75	
80 eye bolts, various sizes	23 60	
37 bolts for bands, various sizes	27 75	
		2,381 60
348 department stop screws, various sizes	$1,594 25	
145 partly finished stop screws, various sizes	277 50	
24 stop screws for fire main	133 25	
55 Viney stop screws	164 00	
34 Barton stop screws	204 00	
5 Eddy valve screws	33 75	
113 old and new style stop screws	1,054 50	
6 monkey screws	12 00	
73 socket screws	147 00	
48 socket spindles	109 50	
		3,729 75

52	air pump brasses, 36 air pump straps, 55 air pump keys, 45 air pump gibs	$813 00	
126	fire hoe heads	220 50	
200	sketch plates	50 00	
50	back plates for fire hoe heads	37 50	
3	pinion wheels for sand washer	15 75	
12	wedge block bolts	15 00	
	Parts for turntable and coal car wheels and axles	288 90	
4	stop boxes and covers	10 00	
			$1,450 65
1	partly finished 48 in. rotary valve.	$536 00	
1	iron casting, 36½ in. plunger	310 50	
			846 50
1	crosshead guide	$42 50	
7	castings of air pump plungers	51 45	
24	rough turned steel rods	1,323 30	
16,594	lbs. miscellaneous iron castings	497 82	
6,316	lbs. iron pump machinery castings	315 80	
13,730	lbs. iron, loam castings	686 50	
9,730	lbs. red brass castings	1,654 10	
6,907	lbs. Ajax metal castings	1,588 61	
			6,160 08
1,008	lbs. expansion metal	$252 00	
1,586	lbs. rolled brass	380 64	
703	lbs. Tobin bronze	196 84	
572	lbs. phosphor bronze	143 00	
22½	lbs. brass tubing	5 63	
1,002	lbs. brass spring wire	250 50	
6,923	lbs. American cast steel	553 84	
1,731	lbs. English cast steel	311 58	
100	lbs. Unital steel	50 00	
400	lbs Muschette steel	140 00	
520	lbs. shear steel	36 40	
606	lbs. spring steel	36 36	
98	lbs. Midvale steel	7 84	
1,900	lbs. Hex. steel	114 00	
			2,478 63
	Lumber	$524 08	
	Hardware	270 78	
	Forage	23 14	
	Leather belting	103 60	
	Coal and coke	190 00	
			1,111 60
	Total inventory January 1, 1911		$39,245 59

Furnished to Districts in 1910.

Districts.	No. 1 fire hydrants	No. 2 fire hydrants	Wedge stops.							Plugs.		Iron bands.	Stop screws.
			4″	6″	8″	10″	12″	16″	30″	Brass.	Wooden.		
First	33	1	3	27	1	2	2	----	----	37	269	1	30
Second	41	----	----	9	8	1	3	----	----	20	522	----	72
Third	104	----	----	128	37	2	3	----	----	45	378	54	36
Fourth	44	----	5	65	6	1	2	----	----	24	168	----	78
Fifth	5	----	----	6	1	2	----	----	1	6	----	----	2
Sixth	85	----	----	92	19	----	18	4	----	58	102	30	12
Seventh	95	----	----	127	11	4	4	----	----	27	118	6	----
Totals	407	1	8	454	83	12	32	4	1	217	1,557	91	230

Stops and Fire Hydrants Built in 1910.

12	4-in. stops, at $16	$192 00
526	6-in. stops, at $18.50	9,731 00
78	8-in. stops, at $28.50	2,223 00
29	10-in. stops, at $37.50	1,087 50
38	12-in. stops, at $48	1,824 00
8	16-in. stops, at $80	640 00
1	30-in. stop, at $270	270 00
475	No. 1 leather valve fire hydrants, at $34	16,150 00
	Total	$32,117 50

Fire Hydrants Repaired in 1910.

378 rubber valves.
24 No. 1 leather valves.
6 No. 2 leather valves.

APPENDIX F

REPORT

OF THE

CHIEF DRAUGHTSMAN

ON THE

HYDROGRAPHIC WORK

FOR THE YEAR 1910

Philadelphia, January 1, 1911.

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

DEAR SIR:—The following report on hydrographic work under my charge, and on data collected during the year 1910, is respectfully submitted.

Rainfall observations at 20 stations, from which the Bureau obtained these data, have been carried on, completing 28 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, recording continuously the

height of water flowing in the streams. From the curves traced by these instruments the daily, monthly and yearly flow is computed.

The total observed precipitation for the year ending October 1, 1910, was slightly below the normal for the years during which these observations have been made.

The greatest monthly rainfall on the areas comprising the watersheds of the Schuylkill, Perkiomen, Neshaminy and Tohickon streams during the year was 6.41 inches, being the average of 17 stations for the month of April.

The precipitation for March, which was not much over one-half of an inch, was the smallest for the year. 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, Tohickon and Schuylkill, making 27 years of continuous records relative to stream flow on the three first-named streams, and 12 years on the Schuylkill river. Observations on the Wissahickon were subject to so much interruption that a continuous record for over one year was impossible, and 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 records of the automatic gauge, the known pumpage from the river, the quantity used for power through the wheels, 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	17.80
1902	29.01	30.74	29.02
1903	27.23	26.32	27.79
1904	23.07	23.37	18.84
1905	23.62	17.98	18.95
1906	21.67	24.41	17.31
1907	28.034	30.25	21.72
1908	18.708	20.307	17.096
1909	15.718	15.734	10.315
1910	16.923	18.666	12.262

At the 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 a few days in July, August and September, 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 partial abandonment of the river as a source of domestic supply since the completion of the filtration plant at Torrresdale.

The amount pumped by steam power at the Roxborough, Belmont and Queen Lane Pumping Stations was not much over 6,500 cubic feet per second, instead of 15,000 to 55,000 cubic feet per second, the variation being due to the use by the Fairmount Works of the water wheels for power.

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

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

I.	Monthly precipitation on sundry watersheds.	
II., III., IV.	Rainstorms exceeding ½ 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.

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, while the rainfall for April, July and August, months of greatest evaporation, was much above the monthly average, very little of the rainfall reaching the streams.

These conditions combined to produce a low run off in the rivers, although the average rainfall for the year is but little below the average for the past 28 years.

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 1910 completing 28 years of records of rainfall and 27 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 water sheds adjoin each other, thus making it possible that the records of stream flows can be combined to cover one large area on which the observations have been made consecutively, 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 thus 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.

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

Mr. John C. 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 of the preceding 24 hours."

Yours respectfully,

JOHN E. CODMAN

In Charge of Hydrographic Work.

TABLE I.

Monthly Precipitation on Sundry Watersheds Compared with U. S. Weather Bureau Observations at Philadelphia.

	Philadelphia Series					Schuylkill Series					Perkiomen Series		Delaware Series		Tohickon Series			Neshaminy Series		
	U. S. Weather Bureau	Water Bureau Auto.	Water Bureau Ground Gauge	Pennsylvania Hospital	Shawmont	Lebanon	Reading	Pottsville	Browers	Hamburg	Seisholtzville	Spring Mount	Moorestown	West Chester	Ottsville	Smith's Corner	Point Pleasant	Lansdale	Forks of Neshaminy	Doylestown
Elevations are in Feet Above Sea Level	207	66	49	25	368	480	207	150	86	365	870	300	65	455	390	480	119	350	143	405
1910	Precipitation in Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
January	4.23	4.97	5.37	4.56	4.19	4.72	4.03	5.91	4.69	3.77	4.44	4.38	4.47	5.36	3.52	4.40	5.15	5.61	5.85	6.78
February	2.99	2.80	2.79	1.63	2.78	4.39	4.83	4.19	3.67	4.02	4.07	3.77	2.42	3.77	3.35	3.99	3.64	3.23	3.58	5.39
March	0.38	0.56	0.56	1.39	0.65	0.75	0.89	0.49	1.02	0.36	0.68	0 67	0.46	0.52	0.93	0.98	1.09	0.52	0.30	0.89
April	4.76	5.23	5.30	5.88	5.04	6.35	5.38	8.13	4.63	8.50	5.60	4.64	5.64	5.50	5.67	7.23	6.61	6.61	6.91	7.93
May	2.13	2.52	2.58	2.40	2.26	2.44	2.64	6.83	2.30	3.79	2.97	2.78	2.25	3.42	2.57	3.89	3.04	2.19	2.92	2.27
June	5.40	5.49	5.58	5.61	5.13	5.77	4.26	5.74	4.16	6.38	4.09	5.67	5.46	7.28	3.97	4.63	3.77	4.24	4.19	4.49
July	1.84	1.40	1.40	2.03	0.80	2.20	3.94	2.26	1.24	2.43	0.55	0.94	1.32	2.92	0.63	0.41	0.40	0.59	0.53	0.16
August	5.70	5.10	5.02	6.22	10.39	2.94	2.90	3.10	3.61	2.41	6.71	5.50	6.08	6.46	5.60	4.99	4.72	5.99	6.46	8.29
September	3.05	3.27	3.27	3.29	2.27	6.14	2.37	4.43	2.36	8.42	2.86	2.52	3.86	2.58	4.06	3.89	4.30	1.82	2.27	4.91
October	2.90	2.85	2.91	2.77	3.58	1.94	1.90	2.43	3.04	1.58	2.15	2.23	3.05	3.14	1.96	2.48	2.47	2.71	4.00	2.11
November	3.65	3.21	3.21	2.88	2.67	2.81	2.61	2.90	2.14	2.88	3.30	3.15	2.73	4.33	3.61	3.56	3.86	3.50	3.19	4.04
December	2.55	2.39	2.39*	1.96	2.48	2.44	2.22	3.32	1.37	3.32	2.32	2.07	3.06	2.34	1.82	1.87	2.33	2.28	2.15	3.19
Total	39.58	39.79	40.38	40.62	42.24	42.89	37.97	49.73	34.23	47.86	39.74	38.32	40.80	47.62	37.69	42.32	41.38	39.29	42.35	50.45
Percentage	100	100	102	103	107	108	92	125	89	121	100	97	103	117	93	107	104	100	107	127
28 years' yearly average—Inches	40.72		43.18	44.76	42.95	42.26	42.87	49.10	44.28	48.68	48.55	44.69	46.80	50.82	46.90	50.09	48.52	44.58	46.51	47.61
28 years' yearly average—Percentages	100		106	107	105	103	105	120	108	119	119	110	114	124	110	122	119	110	114	116
Average deficiency or increase	—1.14		—2.80	—4.14	—0.71	+0.63	—4.90	+0.63	—10.05	—0.82	—8.81	—6.37	—6.00	—3.20	—9.21	—7.71	—7.14	—5.29	—4.16	+2.84
Percentage deficiency or increase	3		3	9			12		20		14	14	13	6	20	15	14	11	9	6

*Eleven inches snow not included.

TABLE II.

Rain Storms Exceeding in Rate 0.25 Inches per Hour as Recorded by the Automatic Rain Gauge at Philadelphia, for the Year 1910.

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	
April 20, shower	0.49	8—00	.23	10	1.38	
May 25, shower	0.70	3—45	.25	15	0.60	
June 9, rain storm	2.25	14—10	.75	60	0.60	
June 12, rain storm	0.80	20—35	.20	20	0.60	
June 18, shower	0.43	1—45	.35	8	2.63	
July 7, shower	0.40	1—00	.40	60	0.60	
August 4, shower	0.72	2—00	.67	15	2.68	
August 10, shower	0.38	8—15	.24	12	1.20	
August 19, shower	1.59	5—55	1.35	60	1.35	
August 26, shower	0.44	1—15	.40	20	1.20	
September 1, rain storm	1.58	20—45	.62	45	0.83	
September 4, shower	0.93	1—00	.84	15	2.56	
October 19 and 20, rain storm	2.17	11—45	.67	48	0.84	

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 1910.

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	
April 17 and 18, rain storm	1,75	33—00	.30	40	0.45	
April 24 and 25, rain storm	1.60	20—40	.40	15	1.60	
April 25 and 26, rain storm	1.13	7—25	.48	30	0.96	
May 25, rain storm	1.26	2—45	.76	24	1.90	
June 9, rain storm	1.53	20—30	.25	40	0.37	
August 4, shower	1.39	1—20	1.35	40	2.02	
August 8, shower	1.15	10—00	.40	30	0.80	
August 10, shower	2.06	12—00	1.60	25	3.84	
August 26, shower	.35	3—00	.30	20	0.90	
September 1, rain storm	1.50	20—20	.30	60	0.30	
October 20, rain storm	2.62	11—30	1.00	20	3.00	
October 22, rain storm	0.50	7—10	.30	60	0.30	
December 23, rain storm	1.26	9—15	.21	20	0.63	

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 1910.

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	
April 17 and 18, rain storm	1.99	34—15	.35	60	0.35	
April 24 and 25, rain storm	.75	17—20	.20	10	1.20	
May 20, rain storm	1.06	9—10	.20	15	0.80	
June 9, rain storm	0.95	7—30	.20	40	0.30	
June 10 and 11, rain storm	1.40	36—40	.32	12	1.60	
June 17, shower	1.30	2—15	.15	15	0.60	
June 18, shower	0.66	1— 5	.60	30	1.20	
July 16, rain storm	0.82	11—10	.47	25	1.13	
August 4, rain storm	0.58	2—10	.50	30	1.00	
August 8, rain storm	2.06	16—50	1.16	60	1.16	
August 10, rain storm	1.12	8—55	.60	30	1.20	
September 1, rain storm	1.48	18—50	.30	60	0.30	
October 22, rain storm	0.62	6—30	.35	60	0.35	

TABLE V.

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

Watersheds		Area in miles	Percentage of Total Area				Average for 27 Years—1883-1910.												
			Woodland	Cultivated	Flats	Roads	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Perkiomen at Frederick, 27 years		152.	25	71	2	2	2.89	3.52	3.79	2.15	1.36	0.93	1.04	0.96	0.97	1.01	1.48	2.24	
Neshaminy below Falls, 27 years		139.3	6	92	¼	1¾	3.19	3.81	3.77	2.13	1.52	0.90	0.96	1.01	0.83	1.04	1.35	2.28	
Tohickon, 27 years		102.2	24	72	2	2	3.83	4.25	4.80	2.49	1.70	0.82	0.97	1.07	1.22	1.04	1.73	2.74	
Perkiomen, at Frederick	Maximum, 27 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, 27 years						0.50	0.85	2.38	0.97	0.46	0.23	0.17	0.18	0.16	0.20	0.24	0.61	
Neshaminy, below Forks	Maximum, 27 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, 27 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, 27 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, 27 years						0.54	0.62	2.98	0.73	0.10	0.07	0.08	0.04	0.03	0.04	0.12	0.56	

TABLE VI.

Average Annual Yield of Sundry Watersheds to October 1, 1910.

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 square mile of drainage area	Average yield in cubic feet per second per square mile of drainage area for each inch of rainfall
Perkiomen at Frederick	27	152.	46.412	22.737	48.990	164,570,000	1.6750	0.0361
Neshaminy below Forks	27	139.3	47.666	22.709	47.635	150,061,400	1.6729	0.0351
Tohickon	27	102.2	48.100	26.809	55.735	130,452,000	1.9750	0.0410
Schuylkill	12	191.5	46.847	19.828	42.323	1,807,860,000	1.4607	0.0312
Sudbury, Mass	35	75.2	45.830	21.843	47.600	78,208,000	1.6091	0.0353
Croton, N. Y.								

TABLE VII.

Comparative Daily Stream Flow, 1909 and 1910.

Watersheds	Area of watershed	Maximum	Gallons	Date	Minimum	Gallons	Date
		Per day	Per sq. mile		Per day	Per sq. mile	
Perkiomen	152.0	2,966,400,000	19,516,000	January 22.	3,684,000	24,230	July 31
Neshaminy	139.3	2,130,600,000	15,295,000	January 22.	4,653,000	33,400	July 29
Tohickon	102.2	2,178,300,000	21,314,000	January 22.	2,280,000	12,000	Aug. 2
Schuylkill	191.5	23,666,000,000	12,358,000	January 22.	138,960,000	72,600	Aug. —

TABLE IX.

Precipitation and Stream Flow on Perkiomen, Neshaminy and Tohickon Watersheds.

DATE 1909	PERKIOMEN AT FREDERICK. AREA OF WATERSHED, 152 SQUARE MILES.							NESHAMINY BELOW FORKS. AREA OF WATERSHED, 139.3 SQUARE MILES.						
	Rainfall in Inches	Inches of Rainfall Flowing Off	Percentage Flowing Off	Monthly Yield of Stream	Average Daily Yield of Stream		Average Yield in Cubic Feet per Second per Square Mile	Rainfall in Inches	Inches of Rainfall Flowing Off	Percentage Flowing Off	Monthly Yield of Stream	Average Daily Yield of Stream		Average Yield in Cubic Feet per Second per Square Mile
				Cubic Feet	Cubic Feet	Gallons					Cubic Feet	Cubic Feet	Gallons	
October	1.245	0.198	15	69,950,000	2,261,600	16,880,000	0.1718	1.056	0.082	7	26,672,600	860,400	6,436,000	0.0715
November	1.455	0.259	18	91,523,000	3,051,000	28,731,000	0.2323	3.916	0.152	5	49,110,000	1,637,000	12,246,000	0.1360
December	5.755	1.581	27	558,200,000	18,006,300	134,690,000	1.3711	4.613	1.072	25	346,990,000	11,193,300	83,731,000	0.9300
1910														
January	4.385	3.166	72	1,117,890,000	36,061,000	269,754,000	2.7459	6.080	4.915	81	1,590,460,000	51,305,100	383,790,000	4.2628
February	3.970	3.868	97	1,366,000,000	48,786,000	364,943,000	3.7148	4.050	3.688	91	1,193,530,000	42,626,000	318,865,000	3.5417
March	0.675	2.348	347	828,974,000	26,741,100	200,036,000	2.0362	0.570	2.332	410	754,750,000	24,340,700	182,110,000	2.0229
April	5.120	1.983	38	700,056,000	23,335,200	174,560,000	1.7769	7.150	2.704	38	875,120,000	29,170,700	218,212,000	2.4237
May	2.875	0.882	30	311,342,000	10,043,300	87,661,000	0.7648	2.460	0.893	36	289,008,000	9,322,800	69,739,000	0.7746
June	4.880	1.321	27	466,330,000	15,544,200	116,145,000	1.1836	4.207	1.243	29	402,382,000	13,412,800	100,332,000	1.1144
July	0.745	0.218	29	76,939,600	2,481,900	18,566,000	0.1890	0.426	0.131	30	42,233,000	1,362,300	10,191,000	0.426
August	6.105	0.611	10	215,620,000	6,955,500	52,031,000	0.4207	6.913	0.597	8	193,191,000	6,232,000	46,618,050	0.5178
September	2.690	0.491	18	173,260,000	5,775,300	43,202,000	0.4398	3.000	0.216	7	69,958,000	2,331,900	17,444,000	0.1938
Totals	39.900	16.923	40	5,976,084,000	16,372,600	122,480,000	1.2467	43.641	18.025	41	5,833,404,000	15,982,000	119,553,000	1.3279
October	2.190	0.231	10	81,631,000	2,633,500	19,697,000	0.2005	2.940	0.156	5	50,449,000	1,627,000	12,161,600	0.1352
November	3.225	0.906	28	319,760,000	10,687,700	79,734,000	0.8116	3.576	0.794	22	256,302,000	8,563,400	64,068,000	0.7115
December	2.195	0.898	41	317,071,000	10,228,000	76,571,000	0.7788	2.540	0.967	31	322,618,000	10,407,000	98,007,000	0.8647
Totals for 1910	39.055	16.923	43	5,974,864,000	16,370,000	122,452,000	1.2465	44.012	18.666	41	6,040,592,000	16,550,000	123,800,000	1.3750

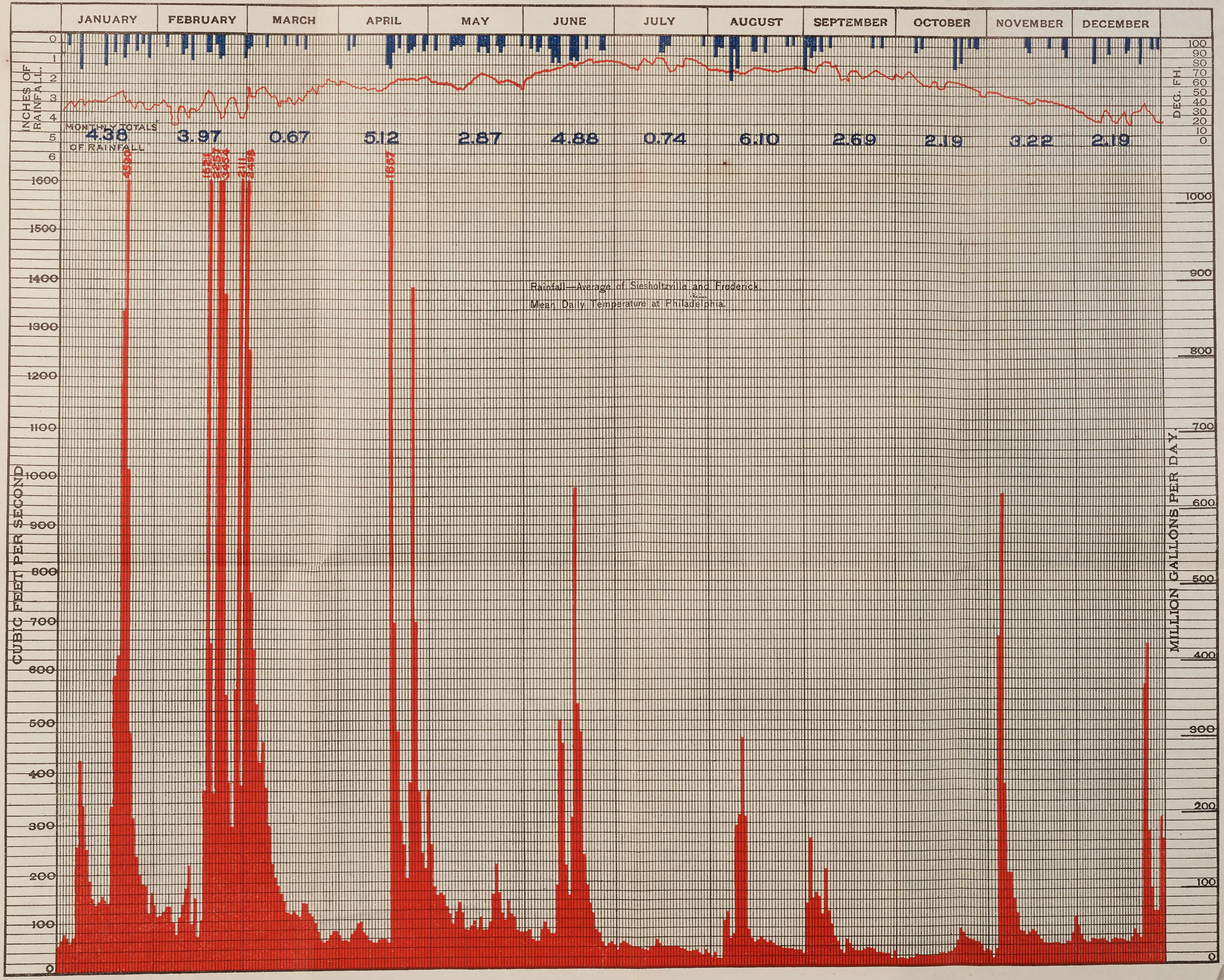
DATE 1909	TOHICKON. AREA OF WATERSHED, 102.2 SQUARE MILES.							SCHUYLKILL AT FAIRMOUNT. AREA OF WATERSHED, 1,915 SQUARE MILES.						
	Rainfall in Inches	Inches of Rainfall Flowing Off	Percentage Flowing Off	Monthly Yield of Stream	Average Daily Yield of Stream		Average Yield in Cubic Feet per Second per Square Mile	Rainfall in Inches	Inches of Rainfall Flowing Off	Percentage Flowing Off	Monthly Yield of Stream	Average Daily Yield of Stream		Average Yield in Cubic Feet per Second per Square Mile
				Cubic Feet	Cubic Feet	Gallons					Cubic Feet	Cubic Feet	Gallons	
October	1.146	0.042	4	9,867,000	318,300	2,381,000	0.0361	1.937	0.139	6	617,940,000	19,933,300	149,120,000	0.1205
November	3.586	0.122	34	29,048,000	968,260	7,243,100	0.1097	2.055	0.133	6	593,395,000	19,780,000	147,964,000	0.1195
December	4.416	1.723	39	409,040,000	13,195,000	98,195,000	1.4943	4.510	0.749	16	3,333,400,000	107,530,000	804,370,000	0.6499
1910														
January	4.356	7.486	171	1,777,500,000	57,337,500	428,920,000	6.4935	5.055	1.865	37	8,296,300,000	267,623,000	2,001,960,000	1.6175
February	3.660	4.844	132	1,150,170,000	41,078,000	307,182,000	4.6521	3.850	1.940	50	8,633,000,000	308,322,000	2,306,400,000	1.8635
March	1.000	3.747	374	889,550,000	28,695,100	214,655,000	3.2997	0.660	2.443	370	10,869,700,000	350,637,600	2,623,940,000	2.1192
April	6.803	4.126	60	979,950,000	32,665,000	244,351,000	3.6993	6.406	1.624	25	7,228,900,000	240,410,000	1,802,600,000	1.4564
May	3.166	0.688	22	163,461,000	5,273,000	39,444,000	0.5972	3.381	1.084	32	4,823,630,000	155,602,000	1,163,920,000	0.9404
June	4.123	1.317	32	312,794,000	10,426,500	77,995,000	1.1796	5.212	1.397	27	6,214,230,000	207,141,000	1,549,520,000	1.2520
July	0.480	0.055	11	13,150,000	424,900	3,173,000	0.0480	1.519	0.363	24	1,615,100,000	52,099,200	389,730,000	0.3149
August	5.100	0.341	7	81,069,000	2,616,200	19,562,000	0.2962	5.057	0.281	5	1,250,800,000	32,050,200	239,752,000	0.2811
September	4.280	0.818	19	194,350,000	6,478,300	48,460,000	0.7336	3.850	0.420	11	1,868,060,000	62,268,500	465,800,000	0.3763
Totals	42.116	25.312	60	6,009,949,000	16,467,000	123,172,000	1.8647	43.492	12.439	28	55,344,455,000	151,630,000	1,134,300,000	0.7166
October	2.393	0.081	3	19,207,000	619,570	4,634,700	0.0702	2.392	0.149	6	665,020,000	21,453,300	160,474,000	0.1297
November	3.676	1.339	36	317,876,000	10,595,500	79,260,000	1.2000	3.136	0.415	13	1,846,540,000	61,551,400	460,436,000	0.3720
December	2.066	1.149	57	272,870,000	8,802,200	65,845,000	0.9963	2.488	0.281	12	1,248,200,000	40,259,600	301,163,000	0.2433
Totals for 1910	40.953	25.991	60	6,171,947,000	16,909,600	126,490,000	1.9150	43.006	12.262	30	54,559,480,000	149,482,000	1,118,200,000	0.9034

Table of Computed Daily Flow of the Schuylkill River at Fairmount Dam. Showing Flow Over Flashboards in Cubic Feet Per Second. Height of Water Above or Below Top of Flashboards in Inches and Computed Pumpage, Leakage and Lockage from the Pool.

1910. DATE.	January.	Inches.	February.	Inches.	March.	Inches.	April.	Inches.	May.	Inches.	June.	Inches.	July.	Inches.	August.	Inches.	September.	Inches.	October.	Inches.	November.	Inches.	December.	Inches.
1	67	¾	960	4¾	23,421	40¼	560	3¼	2,720	9½	1,979	7¾	1,121	5¼	----------	+18	----------	+2	176	1½	----------	+3	175	1½
2	36	½	748	4	16,906	32¼	560	3¼	2,030	8	1,159	5¼	1,485	6¼	----------	+ 9	793	4	----------	+2	----------	+4	175	1½
3	51	¾	948	4¾	11,566	25¼	560	3¼	1,580	6½	624	3½	1,404	6¼	----------	+ 6	1,350	6	----------	+2	----------	+2	175	1½
4	51	¾	1,130	5¼	9,056	21½	505	3¼	1,330	6	1,137	5½	1,158	5¼	67	¾	1,439	6½	----------	+2	1,259	5¾	175	1½
5	188	1½	950	4¾	7,271	18½	505	3¼	1,186	5½	1,507	6½	1,070	5	67	¾	1,607	6¾	----------	+3	7,311	18½	175	1½
6	188	1½	438	3	6,241	16½	266	2	953	4¾	1,167	5½	891	4½	67	¾	1,358	6	----------	+3	1,995	7¾	175	1½
7	343	2½	240	1¾	5,720	15¾	266	2	820	4¼	1,604	6¾	490	3	67	¾	1,269	5¾	----------	+3	1,124	5¼	175	1½
8	548	3¼	152	1¼	4,686	12½	505	3¼	885	4½	1,092	5	382	2½	115	1¼	1,269	5¾	----------	+3	700	3¾	175	1½
9	631	3¾	152	1¼	3,861	12	505	3¼	955	4¾	1,003	5	238	2	449	3	964	4¾	----------	+3	413	2¾	175	1½
10	446	2¾	348	2½	3,055	10¼	396	2½	1,110	5¼	1,234	5¾	273	2	876	4½	581	3¼	----------	+3	301	2¼	175	1½
11	266	2	348	2½	2,300	8½	336	2¼	1,110	5¼	1,236	5¾	356	3¼	2,276	8½	343	2½	----------	+3	259	2	92	1
12	188	1½	157	1¼	2,300	8½	336	2¼	955	4¾	2,496	9	256	3¼	653	3¾	343	2½	----------	+3	92	1	92	1
13	67	¾	157	1¼	2,300	8½	316	2¼	890	4½	3,859	12	267	2	259	2	343	2½	----------	+3	----------	+1	92	1
14	67	¾	240	1¾	1,895	7½	530	3	750	4	2,026	8	267	2	67	¾	343	2½	----------	+3	92	1	92	1
15	36	½	290	2¼	1,535	6½	242	1¾	680	3½	1,567	6½	183	1½	67	¾	343	2½	----------	+4	129	1¼	92	1
16	36	½	960	4¾	1,500	6¾	200	1½	435	2¾	1,865	7½	183	1½	67	¾	259	2	----------	+5	129	1¼	92	1
17	128	1½	1,755	7¼	1,335	6	340	2½	435	2¾	4,970	14	184	1½	259	2	175	1½	----------	+3	58	¾	175	1½
18	128	1½	5,233	14¾	1,250	5¾	471	3	435	2¾	5,480	15¼	350	2½	175	1½	175	1½	----------	+3	92	1	175	1½
19	447	3	4,994	14¼	1,180	5½	7,491	18¾	288	2	6,620	17¼	580	3½	1,269	5¾	175	1½	----------	+3	92	1	----------	+2
20	836	4½	2,800	9¾	1,035	5	4,581	13½	382	2½	6,360	17	255	2	642	3½	----------	0	129	1¼	86	1	----------	+2
21	4,050	12½	4,754	14	1,035	5	6,756	17½	450	3	4,171	12¾	138	1¼	175	1½	----------	+1	83	1	92	1	83	1
22	36,408	54	20,476	36¾	1,035	5	4,540	13½	1,025	5¼	2,810	9¾	138	1¼	175	1½	----------	+2	144	1¼	148	1½	83	1
23	21,472	38	17,391	32¾	1,265	5¾	3,556	11½	1,270	5¾	2,163	8¼	138	1¼	----------	0	----------	+2	144	1¼	92	1	83	1
24	7,900	19½	7,276	18½	1,110	5½	3,320	11	830	4¼	1,963	7¾	92	1	----------	+2	----------	+3	259	2	92	1	479	3
25	4,361	13	3,792	12	1,035	5	12,517	26½	610	3½	1,520	6½	----------	+12	----------	+3	----------	+3	200	1¾	127	1¼	422	2¾
26	3,064	10¼	2,425	9	960	4¾	11,101	24½	8,321	20¼	1,040	5	----------	+12	----------	+3	323	2¼	115	1¼	127	1¼	479	3
27	2,115	*8¼	2,120	8¼	960	4¾	6,786	17½	6,076	16½	880	4½	----------	+12	----------	+3	625	3½	----------	+1	83	1	978	5
28	1,760	7¼	13,226	27½	960	4¾	4,433	13¼	3,860	12	626	3¾	----------	+13	----------	+3	516	3¼	92	1	83	1	367	2½
29	1,600	6¾	----------	----------	900	4½	3,120	10½	2,720	9½	626	3¾	----------	+19	----------	+3	343	2½	----------	+2	92	1	311	2¼
30	1,255	5¾	----------	----------	900	4½	2,920	10	1,940	8	690	3¾	----------	+21	----------	+3	213	1¾	----------	+4	225	1¾	844	4½
31	1,115	5¼	----------	----------	823	4¼	----------	----------	1,420	6¼	----------	----------	----------	+22	----------	+3	----------	----------	----------	+5	----------	----------	1,346	6
Total over flashboards	89,848	----------	94,460	----------	119,396	----------	78,520	----------	48,451	----------	65,477	----------	11,999	----------	7,792	----------	15,149	----------	1,342	----------	15,293	----------	8,127	----------
Total pumpage, leakage and lockage	6,174	----------	5,459	----------	6,411	----------	5,148	----------	7,378	----------	6,447	----------	6,694	----------	6,685	----------	6,472	----------	6,355	----------	6,079	----------	6,318	----------
Grand total	96,022	----------	99,919	----------	125,807	----------	83,668	----------	55,829	----------	71,924	----------	18,693	----------	14,477	----------	21,621	----------	7,697	----------	21,372	----------	14,445	----------

*Below top of flashboards.

STREAM FLOW—PERKIOMEN CREEK AT FREDERICK—1910


JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
INCHES OF RAINFALL.
DEG. FH.
MONTHLY TOTALS OF RAINFALL
4.38
3.97
0.67
5.12
2.87
4.88
0.74
6.10
2.69
2.19
3.22
2.19
4590
1621
2257
3454
2111
2498
Rainfall—Average of Siesholtzville and Frederick.
Mean Daily Temperature at Philadelphia.
CUBIC FEET PER SECOND
MILLION GALLONS PER DAY
0
1
2
3
4
5
6
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
100
90
80
70
60
50
40
30
20
10
0
1000
900
800
700
600
500
400
300
200
100
0

STREAM FLOW—NESHAMINY CREEK BELOW FORKS—1910

JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER

INCHES OF RAINFALL.

MONTHLY TOTALS OF RAINFALL

6.08 | 4.05 | 0.57 | 7.15 | 2.46 | 4.30 | 0.42 | 6.91 | 3.00 | 2.94 | 3.57 | 2.54

DEC. FH.

CUBIC FEET PER SECOND

MILLION GALLONS PER DAY.

Rainfall—Average of Doylestown, Lansdale and Forks of Neshaminy.

Mean Daily Temperature at Philadelphia

STREAM FLOW—TOHICKON CREEK—1910