

# 1941 ANNUAL REPORT BUREAU OF WATER

## INTRODUCTORY

Water is essential to life, health and industry.

The water supply of a city is its most important utility or industry; in regard to the public safety, public health and in relation to other industries.

Let us consider public safety; in case of a large fire, it is obvious that a water supply is essential to fight it.

The public health requires not only a water supply but the water must at all times be pure. If the supply is impure, epidemics of water-born diseases will occur. If the water supply fails, disease and pestilence soon become widespread. In the present war, several cities held out until the water supply failed, then were forced to surrender.

All industries depending on water for their boilers or in their processes would be forced to shut down at once in the event of failure of the water supply.

All of this is true in peact-time and even moreso in case of war.

The water supply system must at all times be ready to meet emergency situations. Ware merely multiplies and magnifies the possibility of such emergencies.

In ordinary times the Bureau is pleased to have the Public visit Water Plants at any time. However, during the present emergency, it is necessary to forbid visitors and even to station soldiers at the various Plants to prevent any possibility of sabotage.

The war has increased our filtered water output by at least thirteen (13) m.g.d. for the average day and forty (40) m.g.d. for the maximum day.

History

--Bureau of Water--

This Public Works unit, as it stands today, is the result from the original units of the system as developed under the 1899 program, with the addition of certain adjustments from time to time such as the installation of rapid sand filters to replace certain of the original roughing filters and the substitution of electric power for steam in some of the pumping stations.

Function

The functions of the Bureau of Water are the operating, extending and maintaining of the City's water supply system and delivering the required quality and quantity at the proper pressures to consumers and fire protection system.

The plant through which the Bureau of Water serves approximately 2,000,000 Philadelphians draws from the Delaware and Schuylkill Rivers with a combined watershed of approximately 9703 square miles.

The entire water supply is treated by filtration, chlorinated and then distributed throughout the system. Torresdale, one of the filtration plants, is the largest in the world.

The bacteriological character of the water is in accord with the standards as set up by the United States Treasury Department.

Organization

This Bureau consists of the Administrative force, 4 Pumping Stations, 5 Filtration Plants, Sanitary Division, Distribution Division, Registrar's Division; combined with the plants of the Water Works and operated by the Bureau of Water are the Northeast Sewage Disposal Works, the Frankford Grit Chamber, the Southwest Sewage Pumping Station, the Mingo Creek and Southeast Pumping Stations, the two latter serving to prevent overflow of lowland ditches in their respective areas.

The personnel of the Bureau consists of 720 employees.

The Bureau has (83) pieces of motorized equipment to take care of its various operations.

In addition there has been engaged an average of 100 on the Water Works Improvement Program and an average of 772 throughout the Bureau on Federal Projects, the latter number having been of substantial value to the operation of the Water Works.

The 100 personnel engaged on the Water Works Improvement Program have been preparing plans and estimates for the rehabilitation of the plant and are located at the Chestnut Street Municipal Pier under the direction of Mr. Seth M. Van Loan, Engineer-in-Charge, and Morris Knowles, Inc., Consulting Engineers.

General

Throughout West and South Philadelphia a water waste survey was conducted and a substantial reduction in water main losses was effected. Numerous leaks on service pipes were corrected and under registering meters were detected and restored to normal registration. The total leakage corrected during the course of survey exceeded five (5) million gallons daily and the value of such work was definitely demonstrated.

Concurrently with the water waste survey was conducted a valve repair project. Much of this distribution equipment was restored to functional ability and the housing cleared of debris whereby access to gate valves was acquired.

The installation of equipment at the Lower Roxborough Filter Plant by the Ozone Processes Company, Incorporated, was completed and experimental work is now progressing.

An unusual number of water main breaks during the early months built the total for year to 301 and 12 respectively on Distribution and High Pressure Systems. To restore and maintain domestic and industrial service with a minimum number of protests reflects creditably on the activity and ability

of limited maintenance force.

The periods of high temperatures through the summer season marked a reduced abuse of the City fire hydrants. Fewer authorized hydrant showers were operated but in spite of the favor granted for attachments, there were numerous violations by unauthorized persons on opening hydrants which ran freely with no control. Such abuse definitely affects the working parts of this valuable equipment. Worthy efforts by the Department of Public Safety to stop this practice were helpful but offences persisted thereby reducing neighborhood pressures for water service and contributing towards a serious waste of water and damage to fire hydrants made evident when resorted to in the event of fire. Replacement of over 885 new hydrants was accomplished during the year and over 1800 since 1940 when money was appropriated to purchase fire hydrants and make renewals.

To establish a uniform system of records covering the characteristics of water before and after delivery from the filters and as contributed to the domestic and industrial consumer, there was selected by the Director of Health of the State a committee to inaugurate an identical policy for sampling and recording water characteristics. This committee has functioned harmoniously and the routine has in no way added a burden to the Bureau of Water.

Water Works System

--Outline of Filtration System--

The present purification facilities include the Belmont, Upper Roxborough, Lower Roxborough and Queen Lane Filtration Plants which take their supply from the Schuylkill River and the Torresdale Plant which takes its supply from the Delaware River. The rated capacities of the five plants total approximately 400 mgd. Their location and capacities are as follows:- The Torresdale plant is located on the Delaware River about fifteen miles above the center of the City. Its capacity is 200 million gallons per day (m.g.d.). The Schuylkill plants are located at Upper Roxborough, with a capacity of 20 m.g.d.; Lower Roxborough, 10 m.g.d.; Queen

Lane, 100 m.g.d. and at Belmont, 70 m.g.d.

There are two general systems of filtration - slow and rapid sand. The slow sand system consists of settling or plain sedimentation with coagulation during storm periods; preliminary filtration with mechanical or rapid sand type filters; slow sand filtration; and treatment with chlorine. The maximum rate of filtration is 6 million gallons per acre per day (m.g.a.d.). The rapid sand system consists of sedimentation and coagulation; filtration through rapid sand filters and treatment with chlorine. The rate of filtration is from 100 to 125 m.g.a.d.

Torresdale and part of Queen Lane have the complete slow sand system. Roxborough and part of Belmont have the slow sand system without pre-filtration. A part of both Queen Lane and Belmont operates as a rapid sand system.

In the slow sand system the preliminary filters operate at a rate of from fifty to one hundred m.g.a.d. They are washed by compressed air agitation and reverse flow of water. The preliminary filters remove the greater part of both the mud and the bacteria.

The water passes through the slow sand filters at a maximum rate of 6 m.g.a.d. These filters remove the remainder of the suspended matter and about 99.99% of the bacteria.

The action of the slow sand filters is mostly biological. The micro-organisms in the water, higher forms of life than bacteria, such as the diatoms, are caught on the top portions of the sand, forming a jelly-like or colloidal layer. This catches the bacteria and fine particles of suspended matter which have passed through the preliminary processes. The water, after passing through these filters, is free from turbidity and is as clear as distilled water.

After a slow sand filter has been in operation for a few weeks, the sand becomes dirty, and will not allow any more water to pass through it. It must then be cleaned by one of the following methods. Sand may be washed and replaced by a

separator operating in the filter bed itself. When the sand clogs up again, the surface is raked, which breaks up the dirty layer on the surface of the sand and allows the suspended matter from the next water to penetrate deeper into the sand. The filter may be raked from one to three times between washings according to the condition of the water, season and demand. By using a cultivator, deeper and more numerous rakings may be obtained. Another method uses a machine which washes the sand in place by a reverse flow of water.

To guard against any sewage type bacteria which may have passed through the filters from entering the water supply, a small dosage of liquid chlorine is added. This dosage varies from one to four pounds per million gallons, equivalent to .12 to .48 parts per million. Chlorine is taken up by the natural alkalinity in the water, forming harmless salts of which there are from five to thirty-five times as many already present in the natural water.

During times of storm, the water in our rivers, especially in the Schuylkill, becomes very muddy or turbid. This turbidity does not readily settle out in the sedimentation basins without some artificial aid. This aid consists of adding a chemical, sulphate of aluminum, or "alum", as it is commonly known.

The water in both our rivers is always slightly alkaline. If it were not naturally so, soda ash or lime would have to be added. The aluminum sulphate reacts with this alkalinity and forms small flakes of the hydroxide of aluminum. These flakes, or floc, are very much like flakes of snow and settle out in the sedimentation basins, carrying down with them the greater part of the suspended matter in the water. The alum added to the water separates out and settles before the water passes through the sedimentation basins.

About four thousand tons of mud have been removed from the water in one year by this alum treatment at the Torresdale Plant alone.

In the rapid sand system, alum is continuously added to the coagulation basins where a floc is formed similar to that mentioned above and passes on to the rapid sand filters. This forms a layer on the sand resembling the one formed by the micro-organisms on the slow sand, and does most of the actual filtering.

The rapid sand filters are washed by a reverse flow of water, with or without compressed air agitation. They operate about a day between washings.

The water from each filter plant in Philadelphia is tested every day in the year. In addition to this, samples are taken periodically two or three times a week from about thirty places distributed over the city to make sure that the water as actually delivered to the people reaches them at all times in a pure state.

Typhoid fever is used as an index of water-borne diseases. The typhoid death rate in Philadelphia has averaged less than 1.0 per 100,000 for the past twelve years.

The average amount of water used each day for the past ten years was 314 million gallons. The average per capita consumption per day was 169 gallons. One day's supply, if placed in gallon jugs, side by side, would reach one and a third times around the world.

However, additional demands have been made on the Bureau this year to take care of the increased consumption in the defense plants and housing units that have been constructed to take care of the increase in workers. The average daily consumption for 1941 was 327 m.g. and the maximum 366 m.g.

Pumping Stations

Electric power is used in the operation of the Belmont Raw Water Pumping Station and in the Shawmont Station which furnishes raw water to Belmont and Roxborough Filter Plants respectively and in the Torresdale Raw Water Station which supplies the Torresdale Filter Plant.

Steam operation has been continued at the Queen Lane Raw Water Station through which a greater part of the output of filtered water from the Torresdale Plant is distributed. The relatively small pumps that raise the water from the Torresdale Plant for distribution in the Northeastern section of the City as well as the Belmont and Queen Lane High Service Pumps are operated with electric power. The Booster Pumping Stations at the Roxborough Plant, Chestnut Hill, Oak Lane and East Park are also electrically operated.

Most of the supply from the Belmont, Roxborough and Queen Lane Plants is distributed by gravity. The output from the Torresdale Plant flows by gravity through a large tunnel to the Lardners Point Pumping Station, where pressure is supplied for distribution. A relatively small proportion of the output from Belmont Plant is pumped for distribution in a high service district. Part of the water coming from the Upper Roxborough Plant, the Queen Lane Plant and the Oak Lane Reservoir, which is supplied from Lardners Point, is repumped for distribution in the Chestnut Hill, Roxborough and Tie-Service Districts. A very small proportion of the supply produced by the Torresdale Filter Plant is repumped for distribution in the northeastern section of the City. The Booster Station at East Park is utilized to augment pressures in the downtown districts at certain times and is available also to furnish water during emergencies to the area west of the Schuylkill River, which is normally supplied from the Belmont Plant.

A High Pressure Fire System, including separate pumps and distribution lines, for the protection of the congested and high value districts of the City is also operated by the Bureau in addition to the existing Distribution System.

Distribution System

The distribution system has over 2500 miles of pipe, 20,000 hydrants and 51,000 valves.

The City is divided into ten (10) districts for the distribution of the water supply. One of these districts for the distribution of the water supply receives a combined supply from the Upper Roxborough, Queen Lane and Torresdale Plants. Of the remaining nine (9), two (2) receive their supply from the Belmont Plant, one (1) from the Queen Lane Plant, three (3) from the Torresdale Plant.

Pressures for distribution at the higher elevations, where water cannot be supplied by gravity, are provided by pumping stations at Belmont, Roxborough, Queen Lane and Torresdale Plants. All water supplied through the Torresdale Filters is pumped for distribution and this is done at the Lardners Point Pumping



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Station. Booster Stations are located at the Oak Lane and East Park Reservoirs and in Chestnut Hill District.

Water is supplied to the Oak Lane Reservoir from the Torresdale Filter Plant through the Lardners Point Pumping Station. A portion of the supply goes by gravity to the area south of the reservoir and the remainder is distributed through the Booster Pumping Station to the district served also by a high pressure supply from Roxborough and Queen Lane Plants.

The East Park Booster Station serves the central business section of the City at times when an increased supply and higher pressures become necessary because of high draft. It is also available to furnish an emergency supply to the area west of the Schuylkill River, which is normally served by the Belmont Plant.

#### Basins

There are three (3) filtered water basins, East Park, George's Hill and Oak Lane. The total capacity available for storage is approximately 900 million gallons.

#### Consumption

The total annual consumption as gauged by the water actually delivered into the distribution system was 119 billion gallons. This is equivalent to the average daily per capita of 169 gallons for a population of 1,931,000 which is the estimated population receiving City water. The per capita consumption through the central business district was much higher.

The above estimated population does not include the shoppers, visitors, and commuters not residing within the City limits.

The integrity of the supply is indicated by the low typhoid fever death rate of 0.4 per 100,000 inhabitants. The fatalities of this disease numbered seven (7) for the year it being the lowest death rate in the history of the City.

#### High Pressure Division

##### Functions

The duties of the High Pressure System embodies the operation of the two (2)

Pumping Stations, one (1) Reservoir and maintaining the High Pressure Distribution System for fire emergencies in two (2) fire belt districts.

Operations

The supervision of the High Pressure System consists of maintaining the High Pressure Distribution lines and Pumping Stations so that the Bureau of Fire may be served when required; Making necessary valve shut-offs when breaks occur in fire belt Distribution district; supervision of emergency crews on breaks and leaks; attending all fires within the two (2) fire belt districts.

Operation of the Philadelphia High Pressure Fire Service System

The Philadelphia High Pressure Fire Service System consists essentially of two pumping stations with 63.34 miles of cast iron pipe and 1069 fire hydrants with the necessary stop valves on mains and hydrants.

The system is divided normally into two parts; one part, covering the central portion of the City, is supplied by the Race Street Pumping Station through 26.38 miles of mains and 434 fire hydrants.

The part covering the northeast section of the City (known as the Mill District) is supplied by the Fairhill Pumping Station through 36.96 miles of mains and 635 fire hydrants.

In case of emergency as in the event of two or more large fires simultaneously in one district, both stations can supply water to these districts.

Construction

The mains in the Central District are cast iron pipe in sizes from 20" to 8" with flanged bolted joints, and those in the Northeast District are cast iron of the same size with universal machined joints.

All hydrants are connected to the mains, by 8" cast iron pipe, with joints corresponding to those on mains, and fitted with 8" stop valves. Those

in central district are both the gate valve type, and the compression valve type with 4" outlets with side gates on the outlets, while in the Northeast District are all of compression valve type with outlets and side gates as above.

It is the intention of the Bureau to do away with the gate valve type hydrants and replace them with the compression valve type hydrants which is a later model.

All mains are fitted with gate valves spaced about 500 feet apart (usually at the street intersections) so that any section of the line can be shut out for repairs, or other emergency.

The RACE STREET PUMPING STATION is equipped with seven TRIPLEX double acting pumps with a rated capacity of 1200 gallons per minute, each under a pressure of 300 pounds and two TRIPLEX double acting pumps of 350 gallons per minute each under the same pressure.

The large pumps are driven by three cylinder gas engines of 300 b.h.p. each and the small pumps by three cylinder engines of 125 b.h.p. each. The total capacity of the station is 9100 gallons per minute.

Each pump is fitted with a permanent relief valve set at 300 pounds pressure and also a motor driven relief valve by means of which the pressure can be maintained at any point below 300 pounds.

The engines are of internal combustion type using illuminating gas for fuel this is mixed with air in proportion of ONE gas to SIX or EIGHT of air, and is ignited by means of a make and break spark supplied from an electric current.

A governor on the engine controls the supply of gas and air used in proportion to the load by regulating the opening in the mixing valve.

The engines are started by passing compressed air of 200 pounds pressure into the cylinders of the engines. This air is stored in tanks and connected

to the engine by means of piping.

The station has two compressors, each operated by one of the small pump engines by means of belt drive; also two electric generators operated by the same engine, to be used in the event of the outside electric current failing. In addition, each engine is supplied with a storage battery which is kept charged as further means against failure of ignition current.

The engine cylinders are jacketed and water cooled by means of a pipe between the City water supply and the jackets.

The water supply for the central district is pumped from the DELAWARE RIVER through a 36" suction main.

FAIRHILL STATION

The Fairhill Pumping Station is equipped with ten (10) large and one (1) small pumps of the same design as the Race Street Station, driven by gas engine equipped similar to those at Race Street with total capacity of 12,350 gallons per minute; also two compressors and two generators.

In addition to the motor relief valves, on each engine, the station is supplied with two master motor relief valves, each on a by-pass between the discharge and suction main by which the pressure on all pumps can be regulated. The valves are operated by means of double throw switch and controller on a switchboard.

The water supply for the Northeast District is pumped from a storage reservoir of 5,000,000 gallons capacity, through two 24" suction mains.

A static pressure averaging 30 pounds is kept on the main when pumps are not in operation. This is accomplished by means of a four inch by-pass.

STREET TELEPHONE OPERATION

Telephones are erected on posts and are enclosed in iron boxes at various points along the line near or at fire hydrants. These are for the use of the

high pressure force in the general work of maintenance, and also for the use of high pressure operators and fire officials for communication with the pumping station when fires are in progress.

During 1941 the High Pressure Fire Service System received the following calls -

|                                  |   |                                     |
|----------------------------------|---|-------------------------------------|
| Race Street Station responded to | - | 212 alarms                          |
| Fairhill Station responded to    | - | 503 alarms                          |
| Race Street Station pumped       | - | 14,000,000 gallons for fire service |
| Fairhill Station pumped          | - | 23,000,000 " " " "                  |

WATER CONSERVATION

Past experience has shown as the meterage of services increases the average per capita consumption is greatly reduced. Progressive metering, waste water surveys and control of public fire hydrants will reduce waste measurably.

Approximately one-half of the services <sup>224,000</sup>~~224,000~~ are now metered including all commercial and industrial supplies. (See chart for tap waste data).

REVENUE - 1941

The Registrar's Division has made 60,997 inspections of services.

|                                      |   |                              |
|--------------------------------------|---|------------------------------|
| The Bureau received in 1941          | - | \$7,055,826.20 in revenue or |
| an increase over the year of 1940 of | - | 128,997.94.                  |

|                                      |                                     |
|--------------------------------------|-------------------------------------|
| The disbursements for year 1941 were | \$1,037,294.98 for salary and wages |
| and for materials and equipment      | - <u>1,570,641.56</u>               |
| making a total expenditure of        | - <u>\$2,607,936.54</u>             |

Bureau of Water Defense Unit

This was organized under Mayor Samuels and Director Neeson and has a complete active unit on National Defense, with over 70% of all its employees to be used when and where any disaster may occur. On call will be three (3) Emergency Crews, all capable of operating, closing and caring for control valves, and will be at the location of any break within 30 minutes.

A complete Pumping Unit of Emergency Pumps installed on 5-ton truck will follow the Emergency Crews equipped with Foreman, Repairman and tools ready for changing the flow of water to cover sections that may be isolated and to make available a temporary supply of water.

All of these units will function on schedule from the first call until the entire situation is completely controlled.

Water Works Improvement

Seth H. Van Loan, Engineer-in-Charge

Functions

The Water Works Improvement Program involves construction which is to be set from Water Works bond issue of \$18,000,000.00 and additional sums from assessments. To date two appropriations have been made, identified as 500-A for \$250,000.00 and 500-B for \$10,000,000.00.

Activities of Water Works Improvement

There were sixty-four (64) persons on the Water Works Improvement staff January 1, 1941, and the number increased to one hundred eight (108) by the end of July. As of December 31, 1941 there were one hundred (100) persons so employed. The Water Works Improvement Program includes new pumping stations and the reworking of the present stations; the adoption of double filtration by rapid sand filters, followed by slow sand filtration, and the improvement of the distribution system. To date contracts have been awarded for construction amounting to \$1,089,414.08, which includes the pumps for both Lardners Point and Torredale, the new flume at Queen Lane, borings and pipe line work. As of this date the engineering work is about 25% completed. The status of constructions is shown by the following statement.

Status of Construction Contracts From August 1, 1940 to December 31, 1941

| Cont. No. | Title   | Paid to Date        |                       | Total for Completed Contracts and Limit of Contract for Un-completed Contracts |
|-----------|---|---------------------|-----------------------|--|
|           |   | Completed Contracts | Uncompleted Contracts |  |
| 100       | Borings at Torredale                            | \$4,190.00          |                       | \$4,190.00   |
| 101       | 12" Main Moysanensing ave.                      | 4,827.00            |                       | 4,827.00   |
| 102       | 12" Main University Ave.                        |                     | \$12,506.87           | 27,000.00  |
| 103       | Borings at Queen Lane & Belmont                 | 777.08              |                       | 777.08   |
| 105       | Fire Hydrants                                   | 32,700.00           |                       | 32,700.00  |
| 108       | Torredale Pumps & Motors                        |                     |                       | 125,000.00   |
| 109(A)    | Fire Hydrants                                   |                     | 44,886.80             | 57,400.00  |
| 109(B)    | Fire Hydrants                                   |                     | 4,945.54              | 51,500.00  |
| 110       | Queen Lane Inlet Flume                          |                     | 14,843.75             | 70,000.00  |
| 112       | 30" Main 21st street                            |                     |                       | 130,000.00   |
| 113       | Lardners Point Pumps & Motors                   |                     |                       | 150,000.00   |
| 116       | Fittings for Hydrants                           |                     | 12,472.80             | 15,000.00  |
| 117       | Misc. Small Mains Group 1                       |                     |                       | 49,000.00  |
| 118       | Belmont Raw Water Force Mains                   |                     |                       | 220,000.00   |
| 120       | 16" Main Ridge Avenue                           |                     |                       | 8,000.00   |
| 121       | Misc. Small Mains Group 3 (Assessment Bills)    |                     |                       | 115,000.00   |
| 122       | Misc. Small Mains Group 3 (No Assessment Bills) |                     |                       | 29,000.00  |
|           |   | <u>\$42,514.08</u>  | <u>\$89,655.76</u>    | <u>\$1,089,414.08</u>  |

Engineering Division

George S. Levering - Engineer of Distribution

Functions

In charge of all matters pertaining to engineering of the Water Distribution System.

Making plans to lay water mains by private contract, by other City Bureaus and of all water mains to be laid other than under the Water Works Improvement Program.

Making all records from time of application until completion of the finished drawings after the water mains are laid. Furnishing to the public who apply, all information they require pertaining to the Water Distribution System, being guided at all times for what purpose the information is to be used.

Compiling all pumpage and filtration of each Pumping Station and Filtration Plant daily, from recorded charts. From this daily record, a monthly report is made, for the Bureau of Water Accountant to compute the cost of operating each Station and the cost of supplying water to the consumer.

Activities of Division - Year 1941

Following are the activities of this office during the year 1941 -

- 100 private contract drawings made during 1941.
- 78 private contract drawings made in 1941 were laid during 1941.
- 15 private contract drawings made in 1940 were laid during 1941.
- 6 private contract drawings made in 1939 were laid during 1941.
- 99 total private contracts laid during 1941 totaling 48,540 feet.

Records for the above made from time of application to and including plans and records of the finished lay.

Proposed plant of water mains for Poplar Housing Site was made in 1940; there were no new water mains to be laid; but many changes in the existing water mains were necessary and made during 1941, including the abandoning of 4,146' of 6" mains.

Proposed plan of water mains for Passyunk Housing Site No. 1 made and mains laid complete in 1941; 4275' of 6"; 4475' of 8"; 1540' of 12"; total



Proposed water main plans for the following Defense Housing Sites; Passyunk No. 2, Abbottsford, Pennypack, Oxford and Bartram were made by the several architects engaged by the U. S. Government, after consulting with this office as to what was required by the Bureau of Water. All these plans were checked and reviewed and many conferences were held with this Bureau as the Housing Authority Division of the U. S. Government in Washington made many changes in the architect's original plans, which had been approved by the Bureau of Water, and in a great many cases, they would not do the work according to the Philadelphia Bureau of Water standard specifications.

Following is the status of the Defense Housing Projects where the laying of water mains has not been completed.

| <u>Project</u> | <u>No. ft. of mains</u><br><u>6"-8"-12"</u> | <u>Progress</u>  |                  |
|----------------|---|------------------|------------------|
|                |   | <u>Nov. 30th</u> | <u>Dec. 31st</u> |
| Passyunk # 2   | 10,300                                      | 85%              | 99%              |
| Abbottsford    | 6,100                                       | 5%               | 15%              |
| Pennypack      | 15,600                                      | 0%               | 25%              |
| Oxford         | 2,300                                       | 50%              | 90%              |
| Bartram        | 4,600                                       | 10%              | 60%              |

Furnishing data to the Pennsylvania State Highway Department and showing on their blue-prints, existing water mains and proposed water mains for the widening of four (4) bridges and one overpass along Roosevelt Boulevard, Ridge Avenue overpass over Hunting Park Avenue, improvement of 34th Street, Vare Avenue, Oregon Avenue, Island Road, Wessington Avenue and 63rd Street.

Making sketches for the Bureau of Engineering, Surveys and Zoning, of existing and proposed water mains to aid that Bureau in designing sewers.

Checking all plans of proposed new work and changes of all Utility Companies for Highway Supervisor's office, Bureau of Highways, for the purpose of that Bureau issuing permits for the proposed work.

Where errors were found on the old drawings of the Bureau of Water, search was made and drawings corrected. This work of errors and corrections was greatly increased during the year by the errors found in the Distribution System by the Pitometer Company - W.P.A. Pitometer Survey.

General drafting of miscellaneous plans.

There will be 113 Sectional Plates and 23,000 Block Plans of the entire City when the W.P.A. Project, Survey of Water Distribution System, is completed. 76 of these new Sectional Plates with 20,587 Block Plans, were put in service during the year, with 3 sets of blue-prints of the plates and 1 complete set

of Block Plan prints in the Distribution office at 29th & Cambria Streets and 1 complete set of blue-prints of the Plates and of the Block Plans in the Engineer of Distribution's office at City Hall Annex, and a complete file of the tracings of the above Plates and Block Plans in this office.

The installation of this new system has a great advantage over the old system of Field Card Plans, but has and will, necessitate a great deal of additional work in this office revising the tracings and the prints in all files for each water main, valve, fire hydrant, domestic or fire service 4" or larger, that is installed, abandoned, or location changed and correcting for all errors found.

Approximately 350 Field Card Plans were made for the Superintendent of Distribution's office and a duplicate copy for this office, of water mains, valves, fire hydrants, fire and domestic services 4" and larger, installed or abandoned by the Superintendent of Distribution's Division.

Complete records are made of all Distribution work installed or abandoned from time of starting until completing the work.

Investigating in field and correcting poor pressures in West Oak Lane section of Roxborough High Service and in Torresdale High Service.

Inspection of all pipe, specials, valves, fire hydrants, valve box frames and covers and pre-cast concrete valve boxes were inspected at point of fabrication by the Bureau of Water Inspector and a record made of all inspections and the shipping schedules checked with that record.

Consulting with Morris Howles, Inc, engineers on proposed plans for water mains designed and drawn by this Division.

Furnishing data and records for W.E.I. draftsmen.

Daily records of all water pumped and filtered at each Pumping Station and Filtration Plant were calculated from Recorded Charts and Weirs showing the daily passage and filtration, from which a monthly report was made; from this report the Bureau of Water Accountant computes the cost of operating each Station and Plant and the cost of supplying water to the consumers.

The W.P.A. Project of Survey of Water Distribution System started under L.W.D. and continuing through W.P.A. to date has at present a personnel of 34 employees engaged on the work of which 16 are rated and assigned as draftsmen.

To date 76 Sectional Plates and 20,587 Block Plans have been put into service by this Bureau, leaving 37 Plates with 2,076 Block Plans to be completed. Status of Plates and Block Plans not completed:-

|                        |    |
|------------------------|----|
| Checking in Field      | 1  |
| Ready for Field check  | 2  |
| Checking in Office     | 2  |
| Ready for Office check | 9  |
| Tracing                | 1  |
| Ready to be traced     | 4  |
| Drawing                | 4  |
| Ready to be drawn      | 12 |

Now being corrected after Field check 2

This Project started with a drafting force of 20 squad bosses and 120 draftsmen, of which at least 70% were first class draftsmen. The force has gradually dwindled down during the past three years, until all the good draftsmen have received work in private industry and have been replaced by W.P.A. made draftsmen, therefore their work has not been properly performed and so many errors have been found by Office checking and Field checking, that two Plates alone had to be entirely re-drawn this year.

This condition does not reflect on the present or former Project head, for they have done their best with the labor furnished by W.P.A.

The inferior grade of draftsmen on this project, however, has made much work for this office, correcting plans now in service and requiring so much time advising them on work now being done.

ANNUAL REPORT

1941

DISTRIBUTION DIVISION

LIST OF PRIVATE CONTRACTS AND STATUS

Plans have been prepared for the total list as herein shown.

| Plan # | Contract # | Street              | From        | To             | Status      |
|--------|------------|---------------------|-------------|----------------|-------------|
| 1      | 213        | 5th, E.S.           | Chelton     | Medary         | Completed   |
| 2      | 214        | Rvlt. Blvd. N.W.S.  | Comly       | 300' north     | Not awarded |
| 3      | 215        | Howard              | Duncannon   | Wellens        | Completed   |
| 4      | 216        | Hope                | Duncannon   | Wellens        | "           |
| 5      | 217        | Gilbert             | Cliveden    | Upsal          | "           |
| 6      | 218        | Wissahickon         | Manatanna   | Grakyn         | "           |
| 7      | 219        | Grakyn              | Oldline     | Wissahickon    | "           |
| 8      | 220        | Mohican             | Rodney      | Lowber         | "           |
|        | (Bridge)   | Margaret            | Lefevre     | Gaul           | "           |
|        | (Bridge)   | 49th St.            | Kingsessing | Regent         | "           |
|        |            | Poplar Housing Site |             |                | "           |
| 9      | 221        | Robbins 120' E. of  | Large       | Everett        | "           |
| 10     | 222        | Kindred             | Robbins     | Mc Kinley      | "           |
| 11     | 223        | Souder              | Robbins     | Mc Kinley      | Not awarded |
| 12     | 224        | Shelbourne          | Wyoming     | Courtland      | Completed   |
| 13     | 225        | Wyoming E. of       | Pennhurst   | Shelbourne     | "           |
| 14     | 226        | Sharpnack           | Stenton     | Mansfield      | Not awarded |
| 15     | 227        | Howell Pt. W. of    | Rising Sun  | Hasbrook       | Completed   |
| 16     | 228        | Ripley              | Verree      | Rising Sun     | "           |
| 17     | 229        | Loney               | Verree      | Rising Sun     | "           |
| 18     | 230        | Ashville            | Craig       | Leon           | "           |
| 19     | 231        | Pickering           | Vernon Rd.  | Greenwood      | "           |
| 20     | 232        | Oxford Ave. w.s. of | Hellerman   | Pasmore        | "           |
| 21     | 233        | Wellington          | Hawthorne   | Sackett        | "           |
| 22     | 234        | Lansing             | Veree Rd.   | Rising Sun     | "           |
| 23     | 235        | Claridge            | Adams       | Foulkrod       | "           |
| 24     | 236        | Algard              | Cottman     | Wellington     | "           |
| 25     | 237        | Cornelius           | Beverly     | Tulpehocken    | "           |
| 26     | 238        | Wynsam              | Cornelius   | Rodney         | "           |
| 27     | 239        | Pastorius           | "           | "              | "           |
| 28     | 240        | Beverly             | "           | "              | "           |
| 29     | 241        | Hollis              | Walnut Lane | Beverly        | "           |
| 30     | 242        | Third N.H.L. to     | S.H.L. of   | Hupting Park   | "           |
| 31     | 243        | Walker              | Princeton   | Wellington     | Not awarded |
| 32     | 244        | E.S. Castor         | Magee       | 300' southward | Completed   |
| 33     | 245        | Greeby              | Loretta     | Frontenac      | "           |
| 34     | 246        | "                   | Frontenac   | Summerdale     | "           |
| 35     | 247        | Souder              | Unruh       | Magee          | "           |
| 36     | 248        | Horrocks            | "           | "              | "           |

| Plan # | Contract # | Street            | From                | To              | Status               |
|--------|------------|-------------------|---------------------|-----------------|----------------------|
| 37     | 249        | Frontenac         | Intersection        | Benner          | Completed            |
| 38     | 250        | "                 | Devereaux           | 81' southward   | Cancelled            |
| 39     | 251        | Castor            | Hellerman           | 166' north      | "                    |
| 40     | 252        | Mages             | Kindred             | Souder          | "                    |
| 41     | 253        | "                 | Souder              | Horrocks        | "                    |
| 42     | 254        | 21st Street       | Olney               | Cottage Lane    | "                    |
| 43     | 255        | Unruh             | Large               | Horrocks        | Completed            |
| 44     | 256        | Matthias          | Wise's Mill Rd.     | Palairet        | "                    |
| 45     | 257        | Palairst          | Matthias            | 100' east       | "                    |
| 46     | 258        | Belgrade          | Venango             | Atlantic        | "                    |
| 47     | 259        | "                 | "                   | Pickwick        | "                    |
| 48     | 260        | Livingston        | "                   | "               | "                    |
| 49     | 261        | Creston           | Large               | Castor          | "                    |
| 50     | 262        | Atlantic          | Gaul                | Belgrade        | "                    |
| 51     | 263        | Frontenac         | Benner              | Devereaux       | "                    |
| 52     | 264        | Claridge          | Foulkrod            | Harrison        | "                    |
| 53     | 265        | Brigton           | Sackett             | Hawthorne       | "                    |
| 54     | 266        | Horrocks          | Longshore           | Tyson           | "                    |
| 55     | 267        | Tackawanna        | Cheltenham          | Van Kirk        | Not completed        |
| 56     | 268        | Mc Kean           | 27th St.            | 28th St.        | Not awarded          |
| 57     | 269        | State Road        | At Frankford        | Arsenal         | Completed            |
| 58     | 270        | Woodcrest         | Graham              | Salford         | Not awarded          |
| 59     | 271        | 5th Street        | 65th Ave.           | 66th Ave.       | Completed            |
| 60     | 272        | Lansing           | Torresdale          | Edmund          | "                    |
| 61     | 273        | Devereaux         | Hingham             | Palmetto        | Not awarded          |
| 62     | 274        | Marley            | "F" Street          | Montour         | Completed            |
| 63     | 275        | Mc Kinley         | Centre of Large     | E.C.L. Large    | "                    |
| 64     | 276        | Roberts Ave.      | Pulaski             | 1400' west      | Taken over by W.W.I. |
|        |            | Penrose Ferry Rd. | Defense Housing # 1 |                 | Completed            |
|        |            | "                 | "                   | # 2             | Not completed        |
| 65     | 277        | Lowber            | Cliveden            | Yerkes          | Completed            |
| 66     | 278        | Modary            | Old York Rd.        | 15th            | Not completed        |
| 67     | 279        | 18th Street       | Stenton             | Modary          | " "                  |
| 68     | 280        | Frankford         | Tolbut              | Carwithan       | Not awarded          |
| 69     | 281        | Tolbut            | Frankford           | Aberdale        | " "                  |
| 70     | 282        | Aberdale          | Tolbut              | Jackson         | " "                  |
| 71     | 283        | Washington Lane   | 75th Ave.           | 76th Ave.       | Cancelled            |
| 72     | 284        | Ogontz            | " "                 | " "             | "                    |
| 73     | 285        | Rhawn             | Calvert             | Farnsworth      | Completed            |
| 74     | 286        | Rosalie           | Hegerman            | Edmund          | "                    |
| 75     | 287        | Alcott            | "                   | "               | "                    |
| 76     | 288        | Sanger            | Jackson             | 90' north       | "                    |
| 77     | 289        | 76th Ave.         | Ogontz              | Washington Lane | Not awarded          |
| 78     | 290        | Front             | Duncannon           | Wellens         | Completed            |
| 79     | 291        | Cheltenham        | Ht. Airy            | Wadsworth       | "                    |
| 80     | 292        | Wissahickon       | Grakyn Lane         | Cathedral       | "                    |
| 81     | 293        | River St.         | Pier 84 sth.        | 420' nth.       | "                    |
| 82     | 294        | 59th St.          | Overbrook           | City Ave.       | "                    |
| 83     | 295        | Fairfield         | Rhawn               | 110' south      | "                    |
| 84     | 296        | Cheltenham        | Wadsworth           | Intersection    | "                    |
| 85     | 297        | Frankford Ave.    | Benner              | Battersby       | "                    |
| 86     | 298        | Benner            | Frankford Ave.      | Brous           | Not completed        |
| 87     | 299        | Brous             | Benner              | Devereaux       | Not awarded          |

continued

| Plan # | Contract # | Street                 | From       | To         | Status        |
|--------|------------|------------------------|------------|------------|---------------|
| 88     | 300        | Haverford              | City Ave.  | 100' south | Not completed |
| 89     | 301        | Souder                 | Longshore  | Tyson      | Completed     |
| 90     | 302        | Bellford               | Elmwood    | Buist      | Not completed |
| 91     | 303        | Passmore               | Erdrick    | Walker     | Not awarded   |
| 92     | 304        | City Ave.              | Haverford  | 145' east  | " "           |
| 93     | 305        | Haverford Ave.         | City Ave.  | 123' south | " "           |
| 94     | 306        | Princeton              | Sackett    | Hawthorne  | " "           |
| 95     | 307        | Afton                  | Loretto    | Frontenac  | " "           |
| 96     | 308        | Horrocks               | Unruh      | Knorr      | " "           |
| 97     | 309        | Ashville               | Torresdale | Edmund     | " "           |
| 98     | 310        | Knorr )<br>Longshore ) | Horrocks   | 90' east   | " "           |
| 99     | 311        | Henry Ave.             | Allegheny  | -----      | " "           |
| 100    | 312        | Mc Kinley              | Large      | Everett    | " "           |

While plans were prepared in 1940, the following contracts were completed in 1941.

|     |     |             |                   |                 |               |
|-----|-----|-------------|-------------------|-----------------|---------------|
| 61  | 80  | Yerkes      | Rodney            | Lowber          | Completed     |
| 66  | 85  | Cliveden    | "                 | "               | "             |
| 69  | 88  | Cardesa     | "                 | "               | "             |
| 99  | 118 | Devereaux   | N.S. Large        | Roosevelt Blvd. | "             |
| 100 | 119 | "           | S.S. Large        | " "             | "             |
| 113 | 132 | Michener    | W.S. Mt. Pleasant | Mt. Airy        | "             |
| 11  | 151 | Elbridge    | Castor            | Large           | "             |
| 13  | 153 | Castor E.S. | Levick            | Hellerman       | "             |
| 18  | 158 | Kindred     | Knorr             | Longshore       | "             |
| 21  | 161 | Horrocks    | Knorr             | Longshore       | "             |
| 27  | 167 | Kerper      | Loretto           | Frontenac       | "             |
| 33  | 173 | Conlyn      | Kemble            | Grange          | Put on W.W.I. |
| 45  | 185 | Gilbert     | Johnson           | Cliveden        | Completed     |
| 51  | 191 | Elbridge    | Erdrick           | Walker          | "             |
| 52  | 192 | Mayland     | Cheltenham        | 200' south      | "             |
| 55  | 195 | Kingsley    | Henry Ave.        | 335' west       | "             |
| 56  | 196 | Markle      | "                 | " "             | "             |
| 57  | 197 | Bridle Road | Rhawn             | Stanwood        | "             |
| 65  | 205 | Rhawn S.S.  | Fairfield         | Calvert         | "             |
| 68  | 208 | Souder      | Knorr             | Unruh           | "             |
| 69  | 209 | Englewood   | Sackett           | Hawthorne       | "             |
| 72  | 212 | Rawle       | Brous             | Battersby       | "             |

CITY OF PHILADELPHIA

BUREAU OF WATER

PUMPING STATIONS AND FUNCTIONS

The function of pumping the water supply for the system of the City of Philadelphia is divided into raw and filtered water services.

Raw water totaling an average of 350 million gallons per day is obtained from the Delaware and Schuylkill Rivers; the filtered water pumpage and repumpage averages 200 million gallons per day, and the raw water repumpage averages 17-1/2 M.G.D.

The raw water plants having the Schuylkill River as their source of supply are Shawmont, Queen Lane, and Belmont Pumping Stations, while the Torresdale Pumping Station is served by the Delaware River.

Shawmont Pumping Station, located above Flat Rock Dam, is equipped with two (2) - 25 M.G.D. motor driven centrifugal pumps operating entirely on "Off Peak" purchased power. It delivers its supply to the Upper Roxboro Reservoir for treatment and sedimentation. From this point it is repumped into the Upper Roxboro Filters by the Roxboro Booster Station, which is equipped with two (2) - 20 M.G.D., one (1) - 15 M.G.D. and one (1) - 17 M.G.D. motor driven centrifugal pumps, served with purchased power through its parent station - Shawmont. This plant has an average daily output of 17-1/2 million gallons.

Queen Lane Pumping Station, located on the east side of the Schuylkill River below the Wissahickon Creek, is equipped with four (4) - 40 M.G.D. Turbo centrifugal pumps, served by its own boiler plant consisting of eight (8) - 327 h.p., and three (3) - 500 h.p. stoker fired water tube boilers, using small grade anthracite fuel. This plant delivers its supply to the Queen Lane Filter Reservoir, located at Fox and Queen Streets for treatment and sedimentation. This plant has an average daily output of 30 million gallons.

Belmont Pumping Station, located on the west side of the Schuylkill River at Montgomery Drive, is equipped with two (2) - 60 M.G.D., and three (3) - 25 M.G.D. motor driven centrifugal pumps operating on both off and on peak purchased power. This plant delivers its supply to the Belmont Reservoir, located at Ford Road and Belmont Avenue, for treatment and sedimentation. The capacity of this reservoir and filtered water demand governs the relation of the time use of power at the pumping station. This plant has an average daily output of 57 million gallons.

The Torresdale Pumping Station, located on the West side of the Delaware River at Pennypack Street, is equipped with six (6) - 50 M.G.D. motor driven centrifugal pumps, operating on off and on peak purchased power, with an average daily output of 170 million gallons. This plant supplies water for treatment directly to the Torresdale Pre-Filters, whose capacity governs the time use of the purchased power at the pumping station. Filtered water is pumped into the distribution system for

consumption at Lardner's Point, Torresdale High Service, Oak Lane, Roxborough High Service, Belmont High Service, Queen Lane High Service, Chestnut Hill High Service and East Park Pumping Stations.

Lardner's Point Pumping Station, located on the west side of Delaware River at Robbins Street, is equipped with twelve (12) - 20 M.G.D. vertical triple expansion engine driven pumps, and one (1) - 35 M.G.D. turbo centrifugal pump, and has an average daily output of 150 million gallons.

The plant is served by its own boiler plant, consisting of fourteen (14) - 500 h.p. horizontal stoker fired water tube boilers, burning small size anthracite fuel. The filtered water is supplied by gravity to this plant from the Torresdale Filters through a 10'-7" diameter conduit 14,000 feet in length. The filtered water pumped by this station serves generally the section of the municipality east of Broad Street, included in which, is the Oak Lane Reservoir, used as a supply for the Oak Lane Pumping Station to serve certain high elevations of the Oak Lane and Germantown Districts.

The Torresdale High Service Pumping Station, located at State Road and Pannypack Street, is equipped with two (2) - 4 M.G.D., and one (1) - 3 M.G.D. motor driven centrifugal pumps, served by purchased power through its parent station - Torresdale Pumping Station, and has an average daily output of 4 million gallons. This plant obtains its supply from the adjacent Torresdale Filters through the filtered water basin, or the 95 inch diameter steel main supplied from the Lardner's Point Pumping Station. This station supplies the districts comprising Fox Chase and Somerton.

Oak Lane Pumping Station, located at 5th and Chelton Avenue, is equipped with two (2) - 7-1/2 M.G.D.; one (1) - 10 M.G.D., and one (1) - 15 M.G.D. motor driven centrifugal pumps, served by on and off peak purchased power, and has an average daily output of 9-1/2 million gallons. It obtained its supply from the adjacent Oak Lane Reservoir, which in turn receives its filtered water from the Lardner's Point Pumping Station. Certain districts of Oak Lane and Germantown are served by this station, which operates in conjunction with Queen Lane High Service Pumping Station, and Upper Roxborough Filter gravity flow, to service a common district.

Chestnut Hill Pumping Station, located on Germantown Avenue near Gravers Lane, is equipped with one (1) - 1 M.G.D., and two (2) - 2 M.G.D. motor driven centrifugal pumps, served by purchased power, and has an average daily output of one million gallons. It obtains its supply from the Roxborough High Service Pumping Station, and supplies the higher elevations of the Chestnut Hill District.

Queen Lane High Service Pumping Station, located at the filter plant, Queen Lane & Fox Street, is equipped with two (2) - 7-1/2 M.G.D.; two (2) - 15 M.G.D., and one (1) - 20 M.G.D. motor driven centrifugal pumps, serviced by direct on and off peak purchased power, and has an



average daily output of 10-1/2 million gallons. It receives its supply from the effluent of the adjacent filter plant, and serves a common district with Oak Lane Pumping Station and Upper Roxborough Filters.

Belmont High Service Pumping Station, located at the filter plant, Ford Road and Belmont Avenue, is equipped with three (3) - 4 M.G.D., and two (2) - 8 M.G.D. motor driven centrifugal pumps, serviced by on and off peak purchased power, supplied through its parent station - the Belmont Pumping Station, and has an average daily output of 6 million gallons. It receives its filtered water supply from the adjacent rapid sand filters, and serves the high level sections of West Philadelphia, principally in the Overbrook District.

Roxborough High Service Pumping Station, located near Shawmont Avenue and Eva Street, is equipped with one (1) - 3-1/2 M.G.D.; two (2) - 6 M.G.D., and one (1) - 8-1/2 M.G.D. motor driven centrifugal pumps, served by on and off peak purchased power through its parent station - the Shawmont Pumping Station, and has an average daily output of 9-1/2 million gallons. It receives its filtered water supply, under pressure, from the Upper Roxborough Filtered Water Basin, and serves certain high sections of East Oak Lane, Germantown; and the supply to the Chestnut Hill Booster Station.

East Park Booster Station, located at 35rd and Girard Avenue, is equipped with three (3) - 25 M.G.D. motor driven pumps, served by direct purchased power. It is operated to maintain pressures in the commercial district of Philadelphia during periods of high draft, and contributes to the West Philadelphia supply when required. It receives its filtered water supply from the East Park Reservoir storage of approximately 688 million gallons.

## Filtration Division

William Thompson

*asst* Supt. of Filter Plants

The duties of the Filtration Division embodies the operation of five (5) Filter Plants, including Rapid, Slow Sand and Preliminary type filter units, with all treatment and filtered water storage basins.

### Operation of Filter Plants - 1941

Following is a report of the filter plant activities during the year 1941, with tables comparing various plant functions in 1940 and 1941.

The service of water in volume and potability of delivery from all plants was satisfactory.

Little difficulty with ice conditions was experienced on the Filter Plants through the Winter of 1940-1941, although the weather was, at times rather severe. At the Torresdale Pumping Station Inlet we lost pump suction due to ice formation and the resultant low basin just once. This occurred on February 20th and lasted from 6 A.M. to 9 A.M. The greatest accumulation of ice on the Slow Sand Filters at Queen Lane was 8" during February.

### Torresdale Filters

During the year 1941 thirty-four Preliminary Filters were completely revamped and restored to service. This makes a total of one hundred and two (102) or 85% of the total one hundred and twenty (120) Preliminary Filters rehabilitated by W.P.A. forces since the start of the Project.

Results, incidentally, from these improvements are highly gratifying since we can show an approximate 85% reduction in turbidity between our applied water and the Effluent of the Pre-Filters.

Throughout the year there were 55 slow sand filters cleaned. This represents a total cleaning of 80,600 cubic yards of sand.

Badly needed roof repairs were made on the machine shop and two emergency buildings and at the present time preparations are being made to make all necessary roof repairs throughout the plant.

### Queen Lane Filters

The coagulating basins were cleaned in October. The mud deposit averaged 15" for an approximate 2500 cubic yards removal.

Nineteen (19) Rapid Sand Filters and ten (10) Preliminary Filters have been completely revamped under a W.P.A. Project which began in April.

The October 1st preliminary work for the construction of a new concrete flume was begun.

During the year thirty-one Slow Sand Filters were cleaned by the Nichols method of cleansing for a total cleaning of 19015 cubic yards of sand.

Chlorinator, East Park Reservoir

On November 25, 1941 work was completed on the installation of a new water line at East Park Reservoir. This line is 1" copper tubing and will be used as a water supply for a modern chlorinator for treatment of the East Park effluent. The new chlorinator will replace an outdated Paradox chlorinator which has continually given us trouble and prevented an efficient control of chlorine application. We are now connected to a 12" fire hydrant line at 33rd and Montgomery Ave., the 1" line running up the side of the reservoir embankment to a building which will house the new chlorinator.

A new Wallace & Tiernan chlorinator has been delivered to Queen Lane Filters and after demonstration by a Wallace & Tiernan representative, we will install a chlorinator now in use at Queen Lane at the East Park Reservoir. Mr. Jenne is to arrange for the demonstration with the Wallace & Tiernan Co. The building to be used as a chlorine house has been completely rebuilt.

Belmont Filters

The coagulating basins were cleaned in May and again in October. In May the mud deposit averaged 2'0" and in October 3'0". The Raw Water Reservoirs were not cleaned on account of lack of men.

Broken arches and cracks in side walls of slow sand filters #8, 16 and 18 were repaired.

Rapid Sand Filters #2-3-4-6-10 have had the gravel, sand and sub-floor removed, side walls and floors cleaned, troughs scraped and painted, sub floor cleaned and replaced with new separators. The gravel has been screened, cleaned and replaced and the sand cleaned and replaced.

The Administration Building, two slum houses, the gate house, eleven stop houses, the Rapid Sand Filter building and fences around filters and reservoirs have been painted.

A concrete walkway has been built from Ford Road to the sampling point at the clear water basin.

In August a sluice gate was inserted in the 30" valve which connects the Rapid Sand-Clear Well with the Slow Sand Filter Clear Water Basin.

The control of the valve which was previously used as an overflow will afford better and more efficient operation of the Rapid Sand Filters.

During the year there were 28 Slow Sand Filters cleaned by the Nichols method, representing a total of 20,158 cubic yards of sand cleaned.

Upper Roxborough Filters

In February the Gletrac tractor was transferred from Torrasedale Filters to Upper Roxborough Filters. This enables one man, operating the tractor, to cultivate a filter much quicker than before with definitely better results.

All necessary concrete repairs to the court paving were made and approximately 25 cubic yards of concrete were placed on the reservoir drive.

During the year thirteen (13) filters were cleaned by the Nichols method. Some of the filters were cleaned twice during this time and the total amount of sand cleaned was 10,164 cubic yards.

#### Lower Roxborough Filters

In April the Ozone Processes, Inc. began treating the Effluent of Filter #1 with the Ozone method of treatment to reduce tastes and odors.

On June 12, one of the 8" I-Beams which support the floor of the chlorine house collapsed. Four (4) full 150 lb. chlorine cylinders dropped into the clear water basin. The four (4) remaining I-Beams were removed and new beams erected in their place.

#### Output of Filters

| Filters     | 1940                       |                          | 1941                       |                          |
|-------------|----------------------------|--------------------------|----------------------------|--------------------------|
|             | Total Filtered<br>M. Gals. | Ave. per day<br>M. Gals. | Total Filtered<br>M. Gals. | Ave. per day<br>M. Gals. |
| Torresdale: | 60555.8                    | 165.9                    | 59382.8                    | 162.7                    |
| Queen Lane: | 32331.0                    | 88.6                     | 33822.0                    | 92.7                     |
| Belmont :   | 19539.9                    | 53.5                     | 19597.3                    | 53.7                     |
| Upper Rox.: | 6418.1                     | 17.6                     | 6335.2                     | 17.4                     |
| Lower Rox.: | 1002.6                     | 2.7                      | 1089.6                     | 3.0                      |
| Totals :    | 119847.4                   | 328.3                    | 120226.9                   | 329.5                    |

#### Turbidities

| Filters     | 1940           |          |                       |                      |                    | 1941           |          |                       |                      |                    |
|-------------|----------------|----------|-----------------------|----------------------|--------------------|----------------|----------|-----------------------|----------------------|--------------------|
|             | Outlet<br>Riv: | Sed Bas: | Applied<br>Blow Sand: | Applied<br>Nap Sand: | Applied<br>F.W.B.: | Outlet<br>Riv: | Sed Bas: | Applied<br>Blow Sand: | Applied<br>Nap Sand: | Applied<br>F.W.B.: |
| Torresdale: | 48:            | 34       | 9                     | -                    | 0                  | 27:            | 23       | 5                     | -                    | 0                  |
| Queen Lane: | 112:           | 9        | 7                     | 6                    | 1                  | 47:            | 9        | 2                     | 6                    | 0+                 |
| Belmont :   | 123:           | 14       | 14                    | 9                    | 0                  | 53:            | 10       | 10                    | 8                    | 0+                 |
| Upper Rox.: | 163:           | 12       | 12                    | -                    | 0                  | 53:            | 10       | 10                    | -                    | 0                  |
| Lower Rox.: | 163:           | 12       | 12                    | -                    | 0                  | 53:            | 10       | 10                    | -                    | 0                  |

#### Mud Removal

| Filters     | 1940                      |           |            | 1941                      |           |           |
|-------------|---------------------------|-----------|------------|---------------------------|-----------|-----------|
|             | Per Mil. Gals.<br>Per Day | Per Day   | Per Year   | Per Mil. Gals.<br>Per Day | Per Day   | Per Year  |
| Torresdale: | 400 lbs.                  | 33.2 Tons | 12118 Tons | 225 lbs.                  | 18.3 Tons | 6681 Tons |
| Queen Lane: | 925 "                     | 40.9 "    | 14929 "    | 392 "                     | 18.1 "    | 6629 "    |
| Belmont :   | 1025 "                    | 27.4 "    | 10001 "    | 442 "                     | 11.9 "    | 4331 "    |
| Upper Rox.: | 1359 "                    | 11.9 "    | 4344 "     | 442 "                     | 3.8 "     | 1400 "    |
| Lower Rox.: | 1359 "                    | 1.8 "     | 657 "      | 442 "                     | 0.7 "     | 241 "     |
| Total :     |                           | 115.2 "   | 42,049 "   |                           | 52.8 "    | 19282 "   |

Alum Usage

| 1940         |                  |                 |    | 1941             |      |              |  |
|--------------|------------------|-----------------|----|------------------|------|--------------|--|
| Filters :    | Alum Used Lbs. : | Cost            | :: | Alum Used Lbs. : | Cost | :            |  |
| Torresdale : | 1,363,000        | : \$14,712.58   | :: | 542,000          | :    | \$6,066.64   |  |
| Queen Lane : | 5,880,805        | : 65,245.03     | :: | 4,733,053        | :    | 52,313.64    |  |
| Belmont :    | 3,083,335        | : 33,848.22     | :: | 2,601,325        | :    | 29,309.28    |  |
| Upper Rox. : | 308,113          | : 3,355.96      | :: | 229,957          | :    | 2,599.25     |  |
| Lower Rox. : | 56,827           | : 619.93        | :: | 41,218           | :    | 465.55       |  |
| Total :      | 10,692,080       | : \$ 117,781.72 | :: | 8,147,553        | :    | \$ 90,754.36 |  |

Chlorine Usage

| 1940         |                      |                |    | 1941                 |      |             |  |
|--------------|----------------------|----------------|----|----------------------|------|-------------|--|
| Filters :    | Chlorine Used Lbs. : | Cost           | :: | Chlorine Used Lbs. : | Cost | :           |  |
| Torresdale : | 286,026              | : \$ 12,127.50 | :: | 377,128              | :    | \$15,990.23 |  |
| Queen Lane : | 227,705              | : 9,654.83     | :: | 229,456              | :    | 9,728.91    |  |
| Belmont :    | 109,015              | : 4,622.22     | :: | 111,265              | :    | 4,717.63    |  |
| Upper Rox. : | 21,337               | : 904.69       | :: | 36,262               | :    | 1,537.50    |  |
| Lower Rox. : | 5,021                | : 258.03       | :: | 7,003                | :    | 359.96      |  |
| East Park :  | 6,000                | : 308.40       | :: | 7,500                | :    | 385.50      |  |
| Total :      | 655,104              | : \$ 27,875.67 | :: | 768,614              | :    | \$32,719.73 |  |

Hydrated Lime Used

| 1940              |                |            |    | 1941           |             |   |  |
|-------------------|----------------|------------|----|----------------|-------------|---|--|
| Belmont Filters : | 439,216 Lbs. : | \$2,371.76 | :: | 223,685 Lbs. : | \$ 1,140.79 | : |  |
| Queen Lane :      |                |            | :: | 5,700 "        | 29.07       | : |  |
| Total :           | 439,216 Lbs. : | \$2,371.76 | :: | 229,385 Lbs. : | \$ 1,169.86 | : |  |

High Pressure Division

Nicola Mango, Acting Superintendent

Functions

The duties of the High Pressure System embodies the operation of the two (2) Pumping Stations, one Reservoir and maintaining the High Pressure Distribution System for fire emergencies.

The operation of the High Pressure System consists of repairs to the High Pressure Distribution lines and Pumping Stations so that the Bureau of Fire may be served when required.

Recommendations

New fence to be placed around Fairhill Basin on the retaining wall.

Repair the retaining basin wall from S.E. Cor. 7th & Somerset sts. going east to 6th Street, south on 6th Street to the Northwest corner of the fire house (Pipe Line 2) also the banks inside and outside of the basin. At present they are in DANGEROUS CONDITION.

Repairs required on front on Lehigh Ave. Garage and Boiler room doors.

New heating boiler for Fairhill Station.

Make change on the electric light system in the engine room at Fairhill Station, from 12 lights on each engine to 8 Arc lights on one switch, do away with the present 132 small lights, also put Peerless lock guards on all basement lights.

The following report of High Pressure Fire Service operation for the year of 1941 is respectfully submitted:-

MILES OF CAST IRON PIPE

|                         | SIZE - 8"    | 12"          | 16"         | 20"         | <u>MILAGE</u> | <u>HYDRANTS</u> |
|-------------------------|--------------|--------------|-------------|-------------|---------------|-----------------|
| FACE STREET<br>District | 12.25        | 11.05        | 2.10        | 1.00        | 26.38         | 454             |
| FAIRHILL<br>District    | <u>12.48</u> | <u>10.50</u> | <u>6.50</u> | <u>7.50</u> | <u>36.98</u>  | <u>635</u>      |
| TOTALS                  | 24.69        | 21.55        | 8.60        | 8.50        | 63.34         | 1,069           |

At present time the High Pressure Fire Service consists of -

|         |              |                      |
|---------|--------------|----------------------|
|         | 15           | Miles of flange pipe |
|         | <u>48.34</u> | " " Universal pipe   |
| TOTAL - | <u>63.34</u> | " " pipe             |

SUMMARY OF BROKEN MAINS, VALVE\* AND FIRE HYDRANTS  
IN THE HIGH PRESSURE SYSTEM DURING THE YEAR OF 1941

| <u>FLANGE PIPE</u> | <u>UNIVERSAL PIPE</u> | <u>VALVES</u> | <u>FIRE HYDRANTS</u> |
|--------------------|-----------------------|---------------|----------------------|
| Size - 8" - 6      | Size - 8" - 0         | Size - 8" - 0 | 3 Flange Connections |
| - 12" - 0          | " - 12" - 4           | " - 12" - 0   | 2 Universal "        |
| - 16" - 0          | " - 16" - 2           | " - 16" - 0   |                      |
| - 20" - 0          | " - 20" - 3           | " - 20" - 0   |                      |
| <br>               |                       |               |                      |
| TOTAL - 6          | TOTAL - 9             | TOTAL - 0     | TOTAL 5              |

Total amount of broken Mains, including Valve and Fire Hydrants combined (20) during the year 1941.



R. A. LEAF - SUPT. OF DISTRIBUTION DIVISION

\* \* \* \* \*

FUNCTIONS OF DISTRIBUTION DIVISION

The functions of the Distribution Division of the Bureau of Water are as follows:

- 1 - To control and regulate the volume and pressures in water mains by operating control valves throughout the entire City.
- 2 - To answer and act upon all public complaints relative to leaks, wastes and short supplies of water.
- 3 - To install and maintain all service and fire connections to properties, 3" and larger, for industrial and domestic uses.
- 4 - To insert all ferrule connections to mains for domestic services, up to and including 2".
- 5 - To install and repair fire hydrants, valves and valve boxes, on both High and Low pressure systems.
- 6 - To repair all broken mains on both High and Low pressure systems.
- 7 - To correct all leaks on these mains, ranging in size from 3" to 93" in diameter.
- 8 - To remove discontinued services from mains.
- 9 - To conduct periodical inspections of fire hydrants and the recording of pressures thereon.
- 10 - To compile and maintain plans and records of all of the above functions.

## DISTRIBUTION MAINTENANCE DIVISION

## Activities for the year 1941

---

An unusual number of water main breaks during the early months built the total for year to 301 and 12 respectively on Distribution and High Pressure Systems. To restore and maintain domestic and industrial service with a minimum number of protests reflects creditably on the activity and ability of limited maintenance force.

The periods of high temperatures through the summer season marked a reduced abuse of the City fire hydrants. Fewer authorized hydrant showers were operated but in spite of the favor granted for attachments, there were numerous violations by unauthorized persons on opening hydrants which ran freely with no control. Such abuse definitely affects the working parts of this valuable equipment. Worthy efforts by the Department of Public Safety to stop this practice were helpful but offences persisted thereby reducing water pressures for water service and contributing towards a serious physical damage to hydrants made evident when resorted to in the replacement of over 885 new hydrants was accomplished during

BROKEN MAINS REPORT FOR 1941

The following is a list of broken Low pressure mains during the year.

| <u>MONTH</u>     | <u>SIZES</u> |           |            |           |            |            |            |            | <u>TOTAL</u> |            |
|------------------|--------------|-----------|------------|-----------|------------|------------|------------|------------|--------------|------------|
|                  | <u>3"</u>    | <u>4"</u> | <u>6"</u>  | <u>8"</u> | <u>10"</u> | <u>12"</u> | <u>20"</u> | <u>30"</u> |              | <u>48"</u> |
| <u>January</u>   | 1            |           | 52         | 2         | 2          | 1          |            |            |              | 58         |
| <u>February</u>  | 1            |           | 32         | 1         | 1          | 1          |            |            |              | 36         |
| <u>March</u>     |              | 1         | 21         |           |            | 1          |            | 1          |              | 24         |
| <u>April</u>     | 1            |           | 18         | 1         |            | 1          |            |            |              | 21         |
| <u>May</u>       | 1            | 1         | 12         | 2         | 1          |            |            |            |              | 17         |
| <u>June</u>      |              |           | 13         |           |            |            |            | 1          |              | 14         |
| <u>July</u>      |              |           | 8          | 1         | 1          |            | 1          | 2          |              | 13         |
| <u>August</u>    |              |           | 8          | 1         |            | 1          | 1          |            |              | 11         |
| <u>September</u> |              |           | 8          | 3         |            | 1          |            |            | 1            | 13         |
| <u>October</u>   |              | 1         | 11         | 1         |            |            |            | 1          |              | 14         |
| <u>November</u>  |              | 2         | 19         | 1         | 4          |            | 1          |            |              | 27         |
| <u>December</u>  |              | 2         | 37         | 7         | 3          | 1          | 2          | 1          |              | 53         |
|                  | <u>4</u>     | <u>7</u>  | <u>239</u> | <u>20</u> | <u>12</u>  | <u>7</u>   | <u>5</u>   | <u>6</u>   | <u>1</u>     | <u>301</u> |

Annual Dist. Report

The following is a list of broken High pressure mains during the year 1941.

| <u>MONTH</u>     | <u>SIZES</u> |            |            |            | <u>TOTAL</u> |
|------------------|--------------|------------|------------|------------|--------------|
|                  | <u>8"</u>    | <u>12"</u> | <u>16"</u> | <u>20"</u> |              |
| <u>January</u>   |              |            |            |            |              |
| <u>February</u>  |              | 1          |            |            | 1            |
| <u>March</u>     | 1            |            |            |            | 1            |
| <u>April</u>     |              |            |            |            |              |
| <u>May</u>       | 1            |            | 1          | 1          | 3            |
| <u>June</u>      | 1            |            |            |            | 1            |
| <u>July</u>      |              |            |            |            |              |
| <u>August</u>    |              | 1          |            |            | 1            |
| <u>September</u> |              |            | 2          |            | 2            |
| <u>October</u>   | 2            |            |            |            | 2            |
| <u>November</u>  | 1            |            |            |            | 1            |
| <u>December</u>  |              |            |            |            |              |
|                  | <u>6</u>     | <u>2</u>   | <u>3</u>   | <u>1</u>   | <u>12</u>    |

|                             |           |
|-----------------------------|-----------|
| TOTAL LOW PRESSURE MAINS:-- | 301       |
| TOTAL HIGH PRESSURE MAINS   | <u>12</u> |
| GRAND TOTAL                 | 313       |

## 1941 Annual Report

## Pitometer Waste Water Survey

## West and South Philadelphia

Functions

The Pitometer Survey includes all of West Philadelphia and South Philadelphia districts from Callowhill Street to League Island and from Delaware to the Schuylkill Rivers.

The purpose of these surveys was to discover and correct wasteful conditions in the form of leaks in the mains and services, unauthorized use, and under registration of industrial meters four (4) inches in size and over. Also the repair of valves incidental to satisfactory progress of the work.

Progress of Activities

The West Philadelphia survey was started in May 1940 and was completed March 1941.

The South Philadelphia survey was started in May 1941 and is now approximately 61 per cent. completed.

The following progress has been made -

Leaks Located

|                              |                  |
|------------------------------|------------------|
| 163 Service Leaks            | 989,000 gals.    |
| 79 Abandoned Services        | 1,154,000 "      |
| 10 Joint Leaks               | 1,074,000 "      |
| 12 Broken Mains              | 1,286,000 "      |
| <u>4 Miscellaneous Leaks</u> | <u>200,000 "</u> |
| 268 Leaks                    | 4,703,000 "      |
| <u>7 Meters</u>              | <u>265,000 "</u> |
| Total 275                    | 4,968,000 "      |

Number of Valves Repairs

Valves restemmed

Valves repacked

Valve Repairs involving bonnet removal \_\_\_\_\_

Total valves repaired

These surveys were under the supervision of the Superintendent of Distribution.

WM. F. BEATON - SUPT. OF METERS DIVISION

\* \* \* \* \*

FUNCTIONS OF DIVISION

The Meter Division is responsible for the maintenance of all the ~~212,832~~<sup>225,070</sup> water meters installed on city connections in the City of Philadelphia.

OPERATIONS OF DIVISION FOR 1941

During the year 1941, 22,782 complaints of defective meters were received from various sources; the majority were from the Receiver of Taxes office due to periodic readings, 15,536 meters were removed for repairs, 15,769 meters were reset after repairs were completed, 3,201 were repaired on the premises, these repairs ranging from repairing stuffing box leaks to complete repairs to the large size meters, 15,463 meters were repaired in the shop. All meters removed to the shop for repairs are calibrated for accuracy after repairs and dials returned to 000.

In case of a disputed bill the meter, when requested by the owner, is removed by workmen from the shop for a special test and the owner is notified when to be present at the test.

Our equipment consists of 8 - 1/2 ton 2-man trucks which are in very poor condition; the average number of trucks in service during the year did not exceed 7. Two of the trucks, one of which carries the plumber, are used for meters above 1" and it is often necessary to withdraw this truck, having the plumber from the route in order to repair a broken service pipe.

A condition has arisen within the past 5 years when property settlements or financial conditions involving the property where the meter is defective, so that a certain sum is withheld from settlement until the meter is repaired. We have made it a practice to push these jobs ahead.

Each truck averages approximately 30 miles a day.

All new meters for installation are received at the Meter Testing Station and tested for accuracy, and seal placed on register box and delivered to registered master plumber, for installation when the meter permit is on file at the station and the meter order presented by the plumber is endorsed by the master plumber responsible for the work.

During the year 1941, 8028 new meters of various sizes were tested, seals placed on the register boxes, 7890 meters were delivered for installation.

The city is now 48% metered.



**From:** Supt. of Meters,  
**To:** Mr. Martin J. McLaughlin, Chief of Bureau,  
**Subject:** Annual report of Meter shop for the year 1941.  
 Beginning Jan. 1st. to Dec. 31st. 1941 inclusive.

This does not include work performed by our plumber for Distribution Division and at the Stations.

Complaints on hand Jan. 1st. 1941 22,856  
 Complaints received during 1941 22,782  
 Total complaints 45,638  
 Complaints on hand Jan. 1-1942. 24,123

Meters removed 15,538  
 Meters reset 15,769  
 Meters repaired on premises 3,201  
 Meters repaired in shop 15,463

New Meters tested 8,028  
 New Meters delivered 7890  
 Total new meters delivered to date 243,832  
 Per centage of repairs due to hot water 24%

**Bills rendered**

|           | <u>Material</u> | <u>Labor</u> | <u>Total</u> |
|-----------|-----------------|--------------|--------------|
| January   | 2542.90         | 4379.45      | 6922.35      |
| February  | 1709.67         | 2839.06      | 4548.73      |
| March     | 2221.31         | 4013.13      | 6234.44      |
| April     | 2385.83         | 4048.23      | 6434.06      |
| May       | 3110.92         | 5199.88      | 8310.77      |
| June      | 2560.98         | 4450.35      | 7011.33      |
| July      | 2601.98         | 4552.28      | 7154.26      |
| August    | 2664.12         | 4098.96      | 6762.98      |
| September | 2279.68         | 3462.36      | 5742.04      |
| October   | 3004.83         | 4780.38      | 7785.21      |
| November  | 2801.42         | 3632.35      | 6433.77      |
| December  | 2311.06         | 3318.68      | 5629.74      |
|           | <hr/>           | <hr/>        | <hr/>        |
|           | 29,585.64       | 48,664.96    | 78,250.60    |

WFB:GDP.

*Wm F. Beaton*  
 Wm. F. Beaton,  
 Supt. of Meters.

From; Supt. of Meters,  
 To; Mr. Martin J. McLaughlin, Chief of Bureau,  
 Subject; Detailed report of new meters delivered during the year 1941.

Jan. 10-1942.

| Size              | 5/8"    | 3/4"   | 1"    | 1 1/4" | 1 1/2" | 2"    | 3"    | 4"    | 6"  | 8" | 10" | Total.  |
|-------------------|---------|--------|-------|--------|--------|-------|-------|-------|-----|----|-----|---------|
| Delivered to date | 206,449 | 12,696 | 5,742 | 2,220  | 2,543  | 4,040 | 1,694 | 1,098 | 431 | 46 | 4   | 236,942 |
| Trident           | 78      | 5      | 8     | 4      | 2      | 4     | 3     | 1     | 1   |    |     | 106     |
| Canon             |         |        |       |        |        |       |       |       |     |    |     | 0       |
| Worthington       | 5026    | 114    | 56    | 12     | 16     | 20    | 4     | 2     | 3   |    |     | 5253    |
| Hersey            | 47      | 17     | 16    | 6      | 6      | 24    | 39    | 6     | 6   | 1  |     | 270     |
| Union             |         |        |       |        |        |       |       |       |     |    |     | 0       |
| Enarc             | 10      | 1      |       |        | 1      |       |       |       |     |    |     | 12      |
| Badger            | 1604    | 91     | 41    | 11     | 7      | 9     | 1     |       | 1   |    |     | 1765    |
| Lambert           | 215     | 26     | 6     |        | 1      | 2     |       |       |     |    |     | 250     |
| Keystone          | 96      | 6      | 3     | 1      |        |       |       |       |     |    |     | 106     |
| Federal           |         |        |       |        |        |       |       |       |     |    |     | 0       |
| National          | 106     | 14     | 4     | 1      |        | 2     |       |       | 2   |    |     | 128     |
| Total for year    | 7,851   | 274    | 134   | 35     | 35     | 61    | 47    | 9     | 13  |    | 1   | 7,890   |
| Total to date     | 212,730 | 12,969 | 5,876 | 2,255  | 2,578  | 4,101 | 1,731 | 1,098 | 444 | 46 | 5   | 243,832 |

WFB:GP.

*Wm. F. Beaton*  
 Wm. F. Beaton,  
 Supt. of Meters.

SUMMARY OF BUREAU OF WATER LABORATORY DATA FOR 1941

During the year 1941 the Water Laboratory located at Belmont Filters received 8,550 chemical samples on which were made 52,172 tests of a physical and or chemical nature. Included in these tests were 7,555 taste and odor determinations, 80% of which are directly on the raw water at our intakes and also that going to the consumer, while the remaining 20% consists of river patrol work. The taste and odor tests were performed solely by the River Patrol in addition to their many other duties, none the least of which is to help curb stream pollution.

An additional 123 microscopic examinations for algae in open reservoirs and rivers are also included together with the mechanical analysis of 83 sand samples as well as 286 samples from the experimental ozone plant, on which chemical, bacteriological and taste and odor tests were made.

During the year a total of 34,098 bacteriological samples were received on which were made 120,543 tests of a purely bacteriological nature. Included in the bacteriological figures are 4800 samples collected from 30 fixed points in the Distribution System, also an additional 117 samples as represented by new pipe lines laid during the year.

Among the total samples received for chemical and bacteriological examination are also included 17 as representative of consumer complaints, of which 6 were due to what is commonly called "bad taste", 5 were collected from households where some form of illness occurred and the remaining 6 were in re of what is usually spoken of as "dirty water".

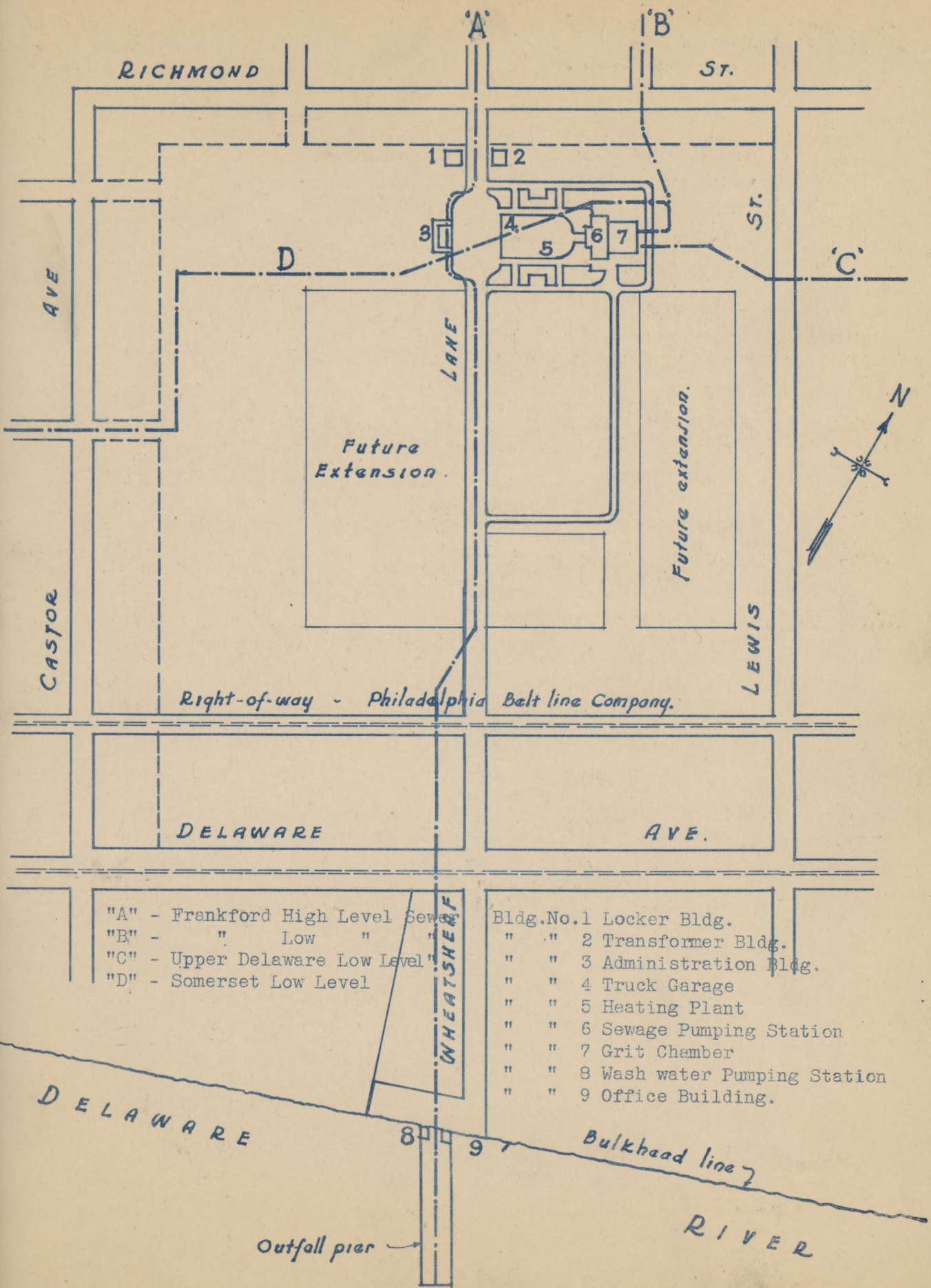
SEWAGE TREATMENT WORKS

FRANKFORD CREEK HIGH-LEVEL GRIT CHAMBER carried a total flow for the year of 12,620 million gallons, from which was intercepted 1,276 cubic yards of wet screenings and 1,011 cubic yards of grit. Twenty-six (26) cubic yards of grease was removed.

NORTHEAST LOW-LEVEL GRIT CHAMBER. This carried a total sewage flow of 8,182 million gallons, from which 199 cubic yards of wet screenings and 522 cubic yards of grit was intercepted.

NORTHEAST SEWAGE TREATMENT WORKS. The total volume of sewage treated during the year amounted to 20,802 million gallons, of which 12,620 million gallons were delivered from Frankford Creek High-Level System, and 8,182 million gallons were contributed by the Upper Delaware Low-Level Collecting Sewer and Upper Frankford Creek Low Level Intercepting Sewer. The total quantity of sludge drawn from Imhoff tanks was 40,121 cubic yards.

NORTHEAST SEWAGE LABORATORY conducted chemical, bacteriological and physical tests of 5,284 submissions. This total included 4,984 samples in connection with the operation of sewage treatment works, 100 from industrial waste investigations, 50 from the Frankford Grit Chamber and 150 from Byberry Sewage Treatment Works, operated by the Department of Health.



"A" - Frankford High Level Sewer  
 "B" - " " Low " "  
 "C" - Upper Delaware Low Level  
 "D" - Somerset Low Level

Bldg.No. 1 Locker Bldg.  
 " " 2 Transformer Bldg.  
 " " 3 Administration Bldg.  
 " " 4 Truck Garage  
 " " 5 Heating Plant  
 " " 6 Sewage Pumping Station  
 " " 7 Grit Chamber  
 " " 8 Wash water Pumping Station  
 " " 9 Office Building.

Sketch Plan - NORTHEAST SEWAGE TREATMENT WORKS PROPERTY - 45th. Ward.

CITY OF PHILADELPHIA  
BUREAU OF ENGINEERING AND SURVEYS  
DEPARTMENT OF PUBLIC WORKS

NORTHEAST SEWAGE TREATMENT WORKS

- Location - Richmond Street and Wheatsheaf Lane.
- Site - Total area 160 acres - plant area 7 acres.
- Process - Coarse screens, grit interception, sedimentation.  
bacterial digestion in Imhoff tanks, effluent to river.
- Capacity - present 60,000,000 gallons daily; future 415,000,000.
- Population - present 300,000 persons; future 2,100,000.
- Units - 32 Imhoff tanks; 80 sludge beds.
- Sewage - Sanitary and trade wastes from combined system sewers.
- Discharge- Into Delaware River through submerged outlets 600 ft. from shore line.

IMHOFF TANKS

- Size - Rectangular; length 80 feet; width 40 feet.
- Depth - 33 feet overall; water depth 27 feet.
- Compartments- 2 lateral and 3 longitudinal, or 6 hoppers per tank.
- Sludge - depth 13 feet.
- Slots - 4 per tank; width 8 inches; overhang 8-3/8 inches.
- Gas vents - 2 per tank; area 6.24% total surface; .012 square feet per cubic foot sludge storage.
- Sedimentation-period 3 hours, volume 3.13 cubic feet per capita.
- Sludge - storage 1.78 cubic feet per capita; period 8.4 months; quantity .007 cubic feet per capita per day; removal by air lifts.
- Flow - Reversible; baffled.

SLUDGE BEDS

- Size - 18 feet wide, 82 feet long, 15 inches deep.
- Drain - French drain 10 inches graded gravel, 2 inch sand topping vitrified pipe collectors, returning filtrate to influent conduits.

OPERATING RESULTS, 1924 - 1930

- Sewage flow - Daily average 35,000,000 gallons.
- Solids - Settleable CC per litre, influent 4.0; Effluent 0.0; removal 100%  
Suspended PPM, - Influent 178; Effluent 25; removal 86%
- Screenings - (wet) 1.6 cubic feet per mil. gallons sewage treated.
- Grit - 2.6 " " " " " " " "
- Grease - 0.41 " " " " " " " "
- Sludge - 1.1 cubic yards wet per million gallons of sewage;  
specific gravity 1.031  
moisture 90.3%  
alkalinity 1309 PPM  
dry residue - fixed 52%; fats 17.0%

Operation costs excluding interest on investments; \$7.30 per million gallons of sewage treated.

CITY OF PHILADELPHIA

NORTHEAST SEWAGE PUMPING STATION AND GRIT CHAMBER

- Location - Northeast Sewage Treatment Works, Wheatsheaf Lane & Richmond Street.
- Capacity - Ultimate, 300 million gallons daily.
- Population - Ultimate, 1,300,000 persons.
- Sewers - Generally combined system. Sewage Interceptors provided in main sewers for admitting dry weather sewage flow and first flush of street wash, and for diverting stormwater to watercourses.

PUMPING STATION

- Purpose - To raise sewage from low level collecting sewer to settling tanks.
- Size - 140 ft. long X 65 ft. wide; pump floor elev. - 35.5; force main floor elev. - 15.25; motor floor elev. 5.0; ceiling at ridge elev. 45.0.
- Sub - -
- Structure - reinforced concrete designed to withstand floatation against 35 ft. hydrostatic pressure.
- Super- - structural steel framing; exterior of tapestry brick with limestone trim-
- Structure - mings; interior of light buff brick with white enamel brick wainscoting; motor floor of quarry tile.

- Pumps - vertical volute type: (present installation)
  - 1 - 36", 327 RPM, head 35', capacity 31.7 million gallons daily,
  - 1 - 36", 277 RPM, head 26', " 31.7 " " "
  - 1 - 24", 514 RPM, head 36', " 17.3 " " "
  - 1 - 24", 450 RPM, head 27', " 17.3 " " "
  - 1 - 24", 400-450 RPM, " 36', (max) " 17.3 " " "
  - 1 - 24", 335-435 RPM, " 27', " " 17.3 " " "

Future: 6-36" pumps, 36' head, cap. each 31.7 million gallons daily.  
 Direct connected synchronous motors are employed to drive the constant speed pumps as follows:  
     for the 36" pumps, 250 HP motors.  
     " " 24" " against a 36' head, a 150 HP motor  
     " " 24" " " a 27' " , a 125 HP motor

Direct connected variable speed induction motors drive the 24" variable speed pumps as follows:  
 For the pumps operating against a 36' head, a 150 HP motor  
     " " " " " a 27' " , a 125 HP "

Operation -Electricity service supplied by Philadelphia Electric Company at 2300 volts pressure. A two-phase, 3 wire system is employed. Pump motors are started and stopped manually by control levers located on the switchboard, and in addition, a special stop has been located at each motor for emergency use. A motor-operated gate valve, has been placed on the discharge end of each pump, and a hand-operated gate valve on the suction end. Electrical connections are so arranged that upon the stopping of any pump motor the discharge gate valve is automatically closed and the necessity for check valves on the pump discharge is thereby eliminated.

Lubrication of pump and line shaft bearings is accomplished in an automatic gravity feed. Lubrication of motor bearings is independent of this system. All bearings are protected against overheating by temperature relays designed to function when the temperature of the bearing exceeds a pre-determined safe limit. The functioning of a relay on any

Operation: unit arrests the power supply to that motor, and operates a Klaxon horn mounted on the switchboard. At the same time the location of the over-heated bearing is indicated on the annunciator also mounted on the switchboard.

Meters - 2 - 48" and 2 - 54" Simplex indicating and recording flow meters have been installed for indicating the rate of flow and for measuring the volume of sewage pumped. For the purpose of indicating and recording the velocity of the sewage through the flow channels of the grit chamber, and for the guidance of the operator of the pumps, there have been mounted on the switchboard electrically operated velocity meters which are connected to a device located in the flow channels of the grit chamber. To better control these velocities, the 2 - 24" variable speed pumps before-mentioned have been installed to operate in conjunction with the constant speed pumps. By means of large hand wheels mounted on the switchboard, the speed of these pumps may be stepped up in intervals of one revolution per minute within the range of variation for which the pumps are designed. With the velocity meter as a guide, the operator will be enabled to control the rate of pumpage to equal that of the inflowing sewage and to maintain at all times the desired velocity of the sewage through the flow channels of the grit chamber.

GRIT CHAMBER

Purpose: To separate from the sewage before pumping, sand, rags, paper, sticks, etc. not readily responsive to bacterial digestion.

Sub-Structure: 113' X 120' in plan, of reinforced concrete designed to withstand floatation against 35 ft. hydrostatic pressure.

Super-Structure: 113' X 52' in plan, of reinforced concrete.

Operation: Sewage enters the grit chamber from the collecting sewers through three (3) influent channels in which have been placed mechanically cleaned stationary bar screens of 1 1/2" clear openings. Revolving arms lift the solid particles intercepted by the screens to a steel belt conveyor which in turn deposits the screenings in a pneumatic ejector from whence they are conveyed to an incinerator installed for the purpose in the Heating Plant Building. Hydraulically operated sluice gates are placed at the sewer end of the influent channels. In case of power failure in the station, these gates will automatically close.

Seven (7) flow channels have been provided for intercepting the grit present in the sewage. These channels are uncovered, V-shaped in cross-section, and 55 ft. in length, and are designed to maintain a velocity of approximately 1 ft. per second.

For the removal of the sand which has settled out, a screw conveyor has been installed in the bottom of each channel, which conveys it to a bucket elevator at the inlet end of the channel. The sand is lifted by this elevator to a cross screw conveyor which in turn conveys it to a pneumatic ejector from whence it is discharged to the low lands on the site of the Treatment Works.

Electrically operated sluice gates have been placed at the inlet and outlet end of each flow channel for placing the channel out of service in times of repairs.



THE NORTHEAST WORKS LABORATORY

HISTORY

This was equipped and started work in January 1926 by Messrs. T. Elmer Transeau and J. H. Thorpe in the Bureau of Engineering. At that time the work consisted of chemical and bacteriological examinations of sewage and sludge of the new Northeast Works; the influent, effluent and various stages of treatment of the Pennypack Disposal Plant; of industrial wastes of all the industries of Philadelphia collected by an inspector of industrial wastes; of samples of a various nature collected at the experimental plant at the Northeast Works; of grit and sewage from the Frankford Grit Chamber; and of samples of sewage from the Byberry Disposal Plant of the Byberry Hospital.

Starting in May 1928 additional samples were brought every week by the River Patrol of the Water Bureau, who collected trade wastes from all the industrial plants located along the Schuylkill River up to the head waters in an effort to clean the water of the Schuylkill. This extra work was done during 1928, 1929 and 1930.

A check-up of the oxygen demand of the Delaware River was done by the laboratory during 1929 and 1930 when numerous samples were taken at various depths and distances from shore between the city limits to check on pollution of the Delaware River.

The Pennypack plant was discontinued in September 1930 and the new Grit Chamber and Pumping Station at the Northeast Works was substituted, bringing all the sewage from the northeast section of the City to the Northeast Works.

The Northeast Works and Frankford Grit Chamber were transferred to the Water Bureau on January first, 1936. Since then, the Northeast Laboratory has done the chemical and bacteriological tests on sewage,

sludge and grit of the Northeast Works, Frankford Grit Chamber and Byberry State Hospital as well as daily chemical tests on the tap water.

LABORATORY ROUTINE

On sewage the following tests are done daily - total, volatile and bacteria resembling B. Coli. The alkalinity, p.H., free chlorine, carbon dioxide and hardness are done week days on tap water. Alkalinity, chlorides, fats, oxygen consumed, total and free ammonia are done each month on composite four hour daily samples of influent, effluent sewage of the Northeast Works and Frankford Grit Chamber, tested each week. An analysis of sludge is made from each tank of sludge as it is drawn which is an almost continuous operation in Summer.

Alkalinity, p.H. and biological oxygen demand are done each week on sewage, influent and effluent. Analyses of grits collected at Frankford Grit Chamber and at the Northeast Grit Chamber are done when samples are collected, which is about once a week. An average of about 5,000 tests are made each year.

CHIEF CLERK'S DIVISION

FRANK J. GALLAGHER - CHIEF CLERK

\* \* \* \* \*

FUNCTIONS OF THE DIVISION

Supervision of personnel, payrolls, purchasing and ordering of all supplies, which means the handling of all requisitions, auditing all invoices and preparing same for payment, checking engineering estimates for work done under contract, preparing contracts and advertising of same, financial reports and budget data.

ACTIVITIES OF THE DIVISION

The following contracts were handled by this office during the year 1941:

| <u>Nature of Contract</u>                     | <u>Contractor</u>  | <u>Amount of Contract</u>      |
|---|--|--------------------------------|
| Hauling cinders Lardners Pt.                  | Chas. W. Diliberto<br>Morristown, Pa.                      | To Pay City \$602.00 per month |
| Hauling cinders Queen Lane                    | James P. Gallagher<br>4300 1/2 Fleming St., Phila.         | To Pay City \$626.00 per month |
| Transporting water samples                    | Charles Holdway<br>2408 Mifflin St., Phila.                | \$3.50 per day (City to Pay)   |
| Furnishing & delivering<br>fire hydrant parts | A. P. Smith Mfg. Co.<br>East Orange, N. J.                 | \$3200.00                      |
| Furnishing & delivering<br>fire hydrant parts | Chas. Mousley's Sons<br>459 N. 12th St., Phila.            | \$1500.00                      |
| Furnishing & delivering<br>six trailers       | Service Supply Corp.<br>20th & Venango Sts., Phila.        | \$2070.00                      |
| Furnishing & delivering trucks                | University Motors<br>Broad & Christian Sts., Phila.        | \$6768.87                      |
| Furnishing & delivering fire<br>hydrant parts | A. P. Smith Mfg. Co.<br>East Orange, N. J.                 | \$3200.00                      |
| Furnishing & delivering fire<br>hydrant parts | Fairmount Foundry, Inc.<br>3rd & Westmoreland Sts., Phila. | \$1500.00                      |
| Furnishing & delivering<br>stationery, etc.   | Samuel F. Curry, Inc.<br>231 Chestnut St., Phila.          | \$768.00                       |

Notes: Contract for transportation of water samples was let in the amount of \$1247.50 due to the fact that there were insufficient funds to carry for one full year; contract was therefore drawn for a period of 357 days; balance of year was taken care of by additional appropriation and paid by open market orders.

All contracts for alum, chlorine, castings, coal, lamps, fuel oil, gasoline, grease, kerosene, lime, oils, salt, wipers, copper, tin, zinc, oxygen, acetylene, refills and lead are prepared by the Department of Supplies and Purchases. Also bear in mind that when a request for supplies is over \$500.00, a contract is required.

52  
January 22nd, 1942.

W. R. Webster,  
in charge of  
Accounting Division.

**FUNCTION:-** Supervision of Bureau personnel. Preparation of Payrolls, monthly and annual reports, and other accounting data that may be required from time to time. Also property account of Bureau structures and equipment.

ACTIVITIES FOR YEAR, 1941.

| <u>DIVISION</u>           | <u>FINANCIAL REPORT</u>   |  | <u>TOTAL</u>   |
|---------------------------|---------------------------|--|----------------|
|                           | <u>SALARY &amp; WAGES</u> | <u>MATERIAL &amp; EQUIP-<br/>MENT CONSUMED</u> |                |
| Administration            | \$ 68,584.52              | \$ 5,277.72                                    | \$ 73,862.24   |
| Pumping                   | 321,535.00                | 1,096,042.41                                   | 1,417,577.41   |
| Filtration                | 201,017.45                | 207,493.61                                     | 408,511.06     |
| Distribution              | 281,835.50                | 122,097.94                                     | 403,933.44     |
| High Pressure Fire        | 65,263.77                 | 7,766.56                                       | 73,030.33      |
| Sewage Disposal Plants    | 78,729.79                 | 30,705.48                                      | 109,435.27     |
| Miscellaneous             | 758.56                    | -----  | 758.56         |
| Other Bureaus             | 118.10                    | 1,567.37                                       | 1,685.47       |
| <hr/>                     |                           |  |                |
| TOTAL OPERATION & REPAIRS | \$1,017,842.69            | \$1,470,951.09                                 | \$2,488,793.78 |
| Additions and Betterments | 19,452.29                 | 99,690.47                                      | 119,142.76     |
| <hr/>                     |                           |  |                |
| GRAND TOTAL               | \$1,037,294.98            | \$1,570,641.56                                 | \$2,607,936.54 |

Note: Month of December estimated as actual figures are not available at this time.

Note: Operation Costs includes \$486,067.00 Electric Current for Power & Light furnished by Philadelphia Electric Company.

Note: Operation Costs includes \$52,000.00 Labor furnished by Bureau of Mechanical Equipment.

Note: W. W . I. activities not included in this report.



REVENUE ANALYSIS BUREAU OF WATER

1/1/41 to 12/31/41  
1/1/40 to 12/31/40

1941

1940

|                          |                |                |
|--------------------------|----------------|----------------|
| Water Rents Cur.Yr.      | \$2,390,788.76 | \$2,425,944.39 |
| Penalties                | 26,459.51      | 36,042.92      |
| Water Rents Pr.Yr.       | \$260,367.75   | \$290,407.48   |
| Penalties                | 37,734.74      | 42,242.48      |
| Water Rents Cur.Yr.      | \$3,895,479.68 | \$3,662,338.23 |
| Penalties                | 16,469.86      | 25,405.01      |
| Water Rents Pr.Yr.       | \$265,839.16   | \$280,693.98   |
| Penalties                | 29,228.04      | 33,888.64      |
| Pipe Frontage            | 12,970.13      | 16,013.68      |
| Water Repair             | \$66,947.89    | \$56,200.07    |
| Penalties                | 960,40         | 657.42         |
| Special                  | \$1,182.80     | \$562.52       |
| Permits-Fractional Total | \$32,548.33    | \$38,832.14    |
| Rules                    | \$7,810.00     | \$5,881.00     |
| Special                  | \$3,494.55     | \$4,684.00     |
| Water Pipe Searches      | 3,724.50       | 3,382.75       |
| Water Pipe Frontage      | \$1,509.32     | \$6,970.45     |
| City Solicitor           |                |                |
| Rules-Highway Bureau     | \$11,248.00    | \$8,030.00     |
| Material Dept.Supp.      | \$6,091.83     | \$2,598.53     |
| Total Year 1941.....     | \$7,055,826.20 |                |
| Total Year 1940.....     |                | \$6,926,828.26 |
| Increase Year 1941.....  |                | \$128,997.94   |

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REVENUE ANALYSIS BUREAU OF WATER

|                          | <u>1/1/41 to 12/31/41</u><br><u>1/1/40 to 12/31/40</u> |                |
|--------------------------|--|----------------|
|                          | <u>1941</u>  | <u>1940</u>    |
| Water Rents Cur.Yr.      | \$2,390,788.76   | \$2,425,944.39 |
| Penalties                | 26,459.51  | 36,042.92      |
| Water Rents Pr.Yr.       | \$260,367.75   | \$290,407.48   |
| Penalties                | 37,734.74  | 42,242.48      |
| Meter Rents Cur.Yr.      | \$3,895,479.68   | \$3,662,338.23 |
| Penalties                | 16,469.86  | 25,405.01      |
| Meter Rents Pr.Yr.       | \$265,839.16   | \$280,693.98   |
| Penalties                | 29,228.04  | 33,888.64      |
| Pipe Frontage            | 12,970.13  | 16,013.68      |
| Meter Repair             | \$66,947.89  | \$56,200.07    |
| Penalties                | 960,40   | 657.42         |
| Special                  | \$1,182.80   | \$562.52       |
| Permits-Fractional Total | \$32,548.33  | \$38,832.14    |
| Ferrules                 | \$7,810.00   | \$5,881.00     |
| Special                  | \$3,494.55   | \$4,684.00     |
| Water Pipe Searches      | 3,724.50   | 3,382.75       |
| Water Pipe Frontage      | \$1,509.32   | \$6,970.45     |
| City Solicitor           |  |                |
| Ferrules-Highway Bureau  | \$11,248.00  | \$8,030.00     |
| Old Material Dept.Supp.  | \$6,091.83   | \$2,598.53     |
| Total Year 1941.....     | \$7,055,826.20   |                |
| Total Year 1940.....     |  | \$6,926,828.26 |
| Increase Year 1941.....  |  | \$128,997.94   |

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ANNUAL REPORT  
BUREAU OF WATER  
REVENUE 1941

Water Repts

Flat Rates

|            |                   |                |
|------------|-------------------|----------------|
| Current    | \$2,417,248.27    |                |
| Delinquent | <u>298,102.49</u> |                |
|            |                   | \$2,715,350.76 |

Meter Rates

|            |                   |                |
|------------|-------------------|----------------|
| Current    | \$3,911,949.54    |                |
| Delinquent | <u>295,067.20</u> |                |
|            |                   | \$4,207,016.74 |

|                     |                  |                     |
|---------------------|------------------|---------------------|
| Water Pipe Searches | \$3,724.50       |                     |
| " " Frontage        | 14,479.45        |                     |
| Special             | 4,677.35         |                     |
| New Services        | 19,056.00        |                     |
| Meter Repair        | 67,908.29        |                     |
| Miscellaneous       | <u>23,611.11</u> |                     |
|                     |                  | <u>\$133,458.70</u> |
|                     |                  | \$7,055,626.20      |

OK





CITY OF PHILADELPHIA

DEPARTMENT OF PUBLIC WORKS

BUREAU OF WATER

CITY HALL ANNEX

JOHN H. NEESON

DIRECTOR

MARTIN J. McLAUGHLIN

CHIEF OF BUREAU

1941 - ANNUAL REPORT  
WORKS PROGRESS ADMINISTRATION  
IN THE BUREAU OF WATER

\* \* \*

A total of seven projects, six covering improvements to buildings, grounds, etc; restoration of filters at Belmont, Queen Lane and Torresdale; the renovation of Queen Lane Pumping Station; a survey of all underground water pipe in South Philadelphia; the renewal of valves and the installation of fire hydrants throughout the City. One WHITE COLLAR project covering the compilation of data on the Philadelphia Water System.

The above projects have been supervised by Water Bureau representatives at each of the locations.

ACTIVITIES OF THE WORKS PROGRESS ADMINISTRATION

Queen Lane Filters & Pumps - Repairing structure, waterproofing floors, restoring sand and gravel. Men engaged 175

Belmont Filters - Restoring faulty roofs, removing and replacing sand and gravel, reconstruction of beds, painting buildings and removing silt from reservoirs. Men engaged 125

Torresdale Filters and Station - Cleaning filters; rebuilding and revamping units; laying masonry slopes on sedimentation basin; landscaping grounds. Men engaged 225

Survey of Distribution System - Men engaged 70

Water Waste Survey, West & S. Phila. Men engaged 72

Valve and Valve Box Repairs - Men engaged 105

The work this force has produced is and will be of essential value to the Bureau.

Total men engaged 772.

INDEX OF PHOTOGRAPHIC PLATES

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| <u>Plate No.</u> | <u>Title</u>   |
|------------------|--|
| 1                | Philadelphia Water Supply - District Map.                |
| 2                | Center Square Water Works.                               |
| 3                | University Avenue - Contract 102 - 12" Cast Iron Main.   |
| 4                | " " " " " " " "  |
| 5                | Lardners Point Pumping Station.                          |
| 6                | Pumping Station Elevations.                              |
| 7                | Torresdale Filter Beds.                                  |
| 8                | Queen Lane Flume.  |
| 9                | " " "  |
| 10               | Torresdale Filter Beds.                                  |
| 11               | " " "  |
| 12               | Blaisdell Washing Machine.                               |
| 13               | Joint Leak - 6" Main Inside Sewer - 16th & Arch Streets. |
| 14               | Cracked 12" Main - Packer Avenue.                        |
| 15               | Tapping Machine.   |
| 16               | Patent Connection.                                       |