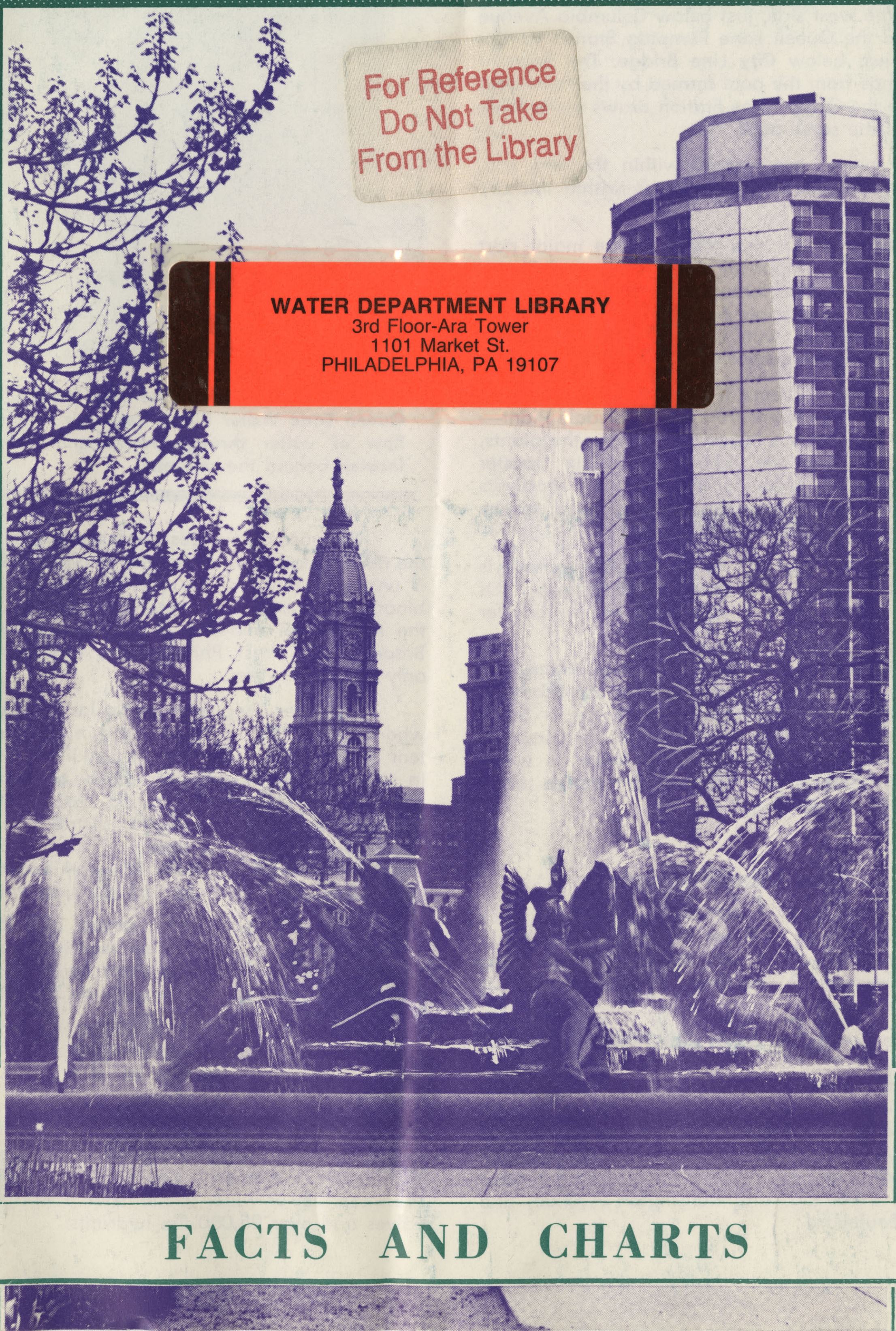
How Water in PHILADELPHIA is Treated and Distributed



1979

FACTS AND CHARTS

Abundant Water From Local Streams...

SOURCES AND DISTRIBUTION

Where does Philadelphia get its water?

The city pumps one-half of its water from the Delaware River, just above the outlet of Pennypack Creek. The other half is pumped from the Schuylkill River at two different locations: the Belmont Pumping Station on the west side, just below Columbia Avenue Bridge, and the Queen Lane Pumping Station on the east side, just below City Line Bridge. The Belmont Station pumps from the pool formed by the Fairmount Dam, while the Queen Lane Station draws water from the head of the same pool.

All sources are located within the city and, with minor exceptions, all service is within the city limits.

After treatment and filtration, the major part of the effluent (or output) of the Belmont and Queen Lane Plants is delivered through the distribution system by gravity. This is possible because these plants have filtered water basins with water level elevations of 239 and 216 feet respectively.

The other effluents from Belmont and Queen Lane—and all the effluent from the Torresdale Plant—are pumped by stations located at, or near the plants, and some effluents are repumped at six booster stations. Pumping helps to maintain the gradients required for satisfactory pressures and good service at all points in the distribution system.

Normally about one-third of plant output is delivered by gravity and two-thirds is pumped. Of the latter, about 15% is repumped at the booster stations.

Because of differences in elevation among city neighborhoods (a difference of 450 feet, for example, between homes in Roxborough and those in South Philadelphia), the city is divided into ten pressure districts. The fact that Philadelphia takes its water from three different river sources also makes some of these districts necessary.

Areas Where Delivered

Delaware water is delivered generally to those areas of the city east of Broad Street, while Schuylkill water reaches consumers west of Broad Street. There are some exceptions, however, to this pattern of distribution.

Thus Delaware water flows west of Broad Street to some neighborhoods south of Erie Avenue. It is also delivered to West Oak Lane and Chestnut Hill, and it may mix with Schuylkill water in the vicinity of East Park Reservoir before the latter water enters central city. Schuylkill water may also cross the Broad Street boundary: it serves the area bounded by Lehigh, Wyoming, and Kensington Avenue, and Roosevelt Boulevard.

Electronic consoles line the filter gallery at the Queen Lane Water Plant. Consoles regulate the flow of water through rapid-sand filter beds located behind the columns.

Because of changes in consumer demands, and the need for occasional changes in plant operations, it is uncertain which of the river waters, or what combination of them, will be received in some areas along the north-south mid-axis of the city represented by Broad Street. West Philadelphia, however, receives only Schuylkill water.

The preceding is of particular interest to those who may be affected by changes in the mineral content of the water, since the Schuylkill water contains in solution about twice the amount present in Delaware water. In the 10-year period 1961-70, the annual hardness of water delivered to distribution from the Torresdale Plant on the Delaware averaged 99 parts per million; annual hardness of water from the plants on the Schuylkill averaged 164 parts per million.

The total population served is 1.95 million. To these customers the Water Department distributes an average of 370 million gallons daily. This is about 190 gallons per day for every person in Philadelphia.

In addition, the department delivers 11 million gallons of water daily to the Bucks County Water and Sewer Authority for distribution in lower Bucks County.

The distribution system contains 3,200 miles of pipes of various sizes, from three inches to seven feet nine inches in diameter. About 142 miles of this pipe are three feet or wider in diameter. There are 78,000 valves and over 25,000 fire hydrants.

Besides the regular distribution system, there is a high pressure fire system covering center city and that part of north central Philadelphia lying east of Broad Street and south of Lehigh Avenue. This is composed of 63 miles of mains, 1,900 valves, and 1,050 hydrants, together with two pumping stations that deliver water at pressures up to 300 lbs. per sq. in. One station is located at Delaware Avenue and Race Street; the other at 7th Street and Lehigh Avenue.

MODE OF TREATMENT

Philadelphia's three water treatment plants are modern. The Torresdale Plant was completed in 1959; the Belmont Plant in 1965; and the principal facilities of the Queen Lane Plant in stages — 1954, 1960, 1971. The plants are of the rapid-sand filter type, with automatic and semi-automatic controls. It is planned to bring all the plant treatment processes under computer control within the next few years.

Daily output of the water treatment plants, in millions of gallons daily, averaged as follows in fiscal 1978:

Belmont	69.7
Queen Lane	108.0
Torresdale	217.8

Although there is some variation at the plants, the treatment process comprises pre-chlorination and pre-sedimentation, chemical treatment, flocculation, sedimentation, filtration, and post chemical treatment.

The first step in treatment is chlorination. The chlorine is added to the water to destroy taste-and odor-producing materials which are chiefly organic matter. This may include the wastes of industries as well as those of natural origin.

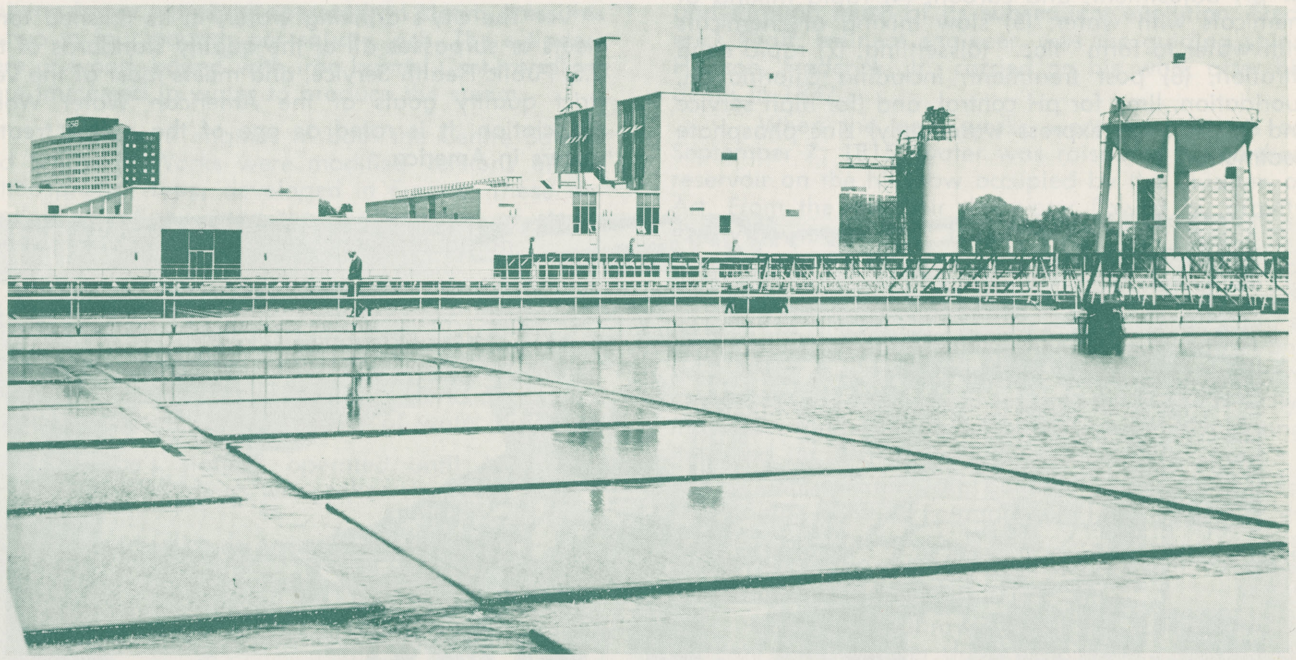
Initial chlorination takes place in a large raw-water reservoir, where the chlorine takes effect and some suspended matter settles out as the water moves slowly through.

The second step is injection of other chemicals into the raw water as it passes under a chemical or pre-treatment building. At this point, alum or ferric chloride or ferrous chloride may be added to promote the later formation of "floc," and chemicals such as carbon or sodium chlorite may be used to control taste and odor.

The third step is for the chemical-laden water to pass through small basins, where the chemicals and water are mixed for more than a half-hour by giant revolving paddles. The mixing causes the formation of "floc," tiny white or brown granules. The floc will enmesh suspended impurities in the water.

When necessary, lime is added to the water to neutralize acidity and create optimum conditions for the formation of floc.

Enmeshment of suspended particles by the floc takes place in large sedimentation basins to which the water next flows. In these basins the water remains quiescent for two to four hours, and the floc settles to the bottom, taking with it more than 90% of the suspended impurities. This prepares the water for filtration.



Water sparkles as it flows off the sedimentation basins at the Belmont Water Plant to enter the filter building (left background). The basins settle out 90% of the impurities in the water.

.....Treated In Modern Plants

.....One Of America's Purest Waters

The water is then filtered through beds of sand and gravel, which remove all particles that remain after the settling period.

As the final step in treatment, the chlorine content of the water is adjusted to ensure safety, and ammonia may be added to counteract chlorinous tastes and odors. At various steps in the treatment process, additional chemicals may be used, or the usual chemicals replaced by others. This is governed by the changes in the condition of the raw water supply.

To help prevent tooth decay in children, fluoride is also added to the water.

Because treatment steps differ slightly at the plants, the successive steps are summarized below:

Belmont: (1) Pre-chlorination to free chlorine residual, (2) settling for 22 hours, (3) application of chemicals—chlorine or chlorine dioxide, alum with lime for pH adjustment, carbon, and ammonia, (4) rapid mixing of chemicals with water, (5) slow mixing of chemicals with water to form "floc," (6) settling, (7) rapid sand filtration, (8) post treatment, including chlorination, zinc phosphate treatment, fluoridation, ammonia, and pH control with lime.

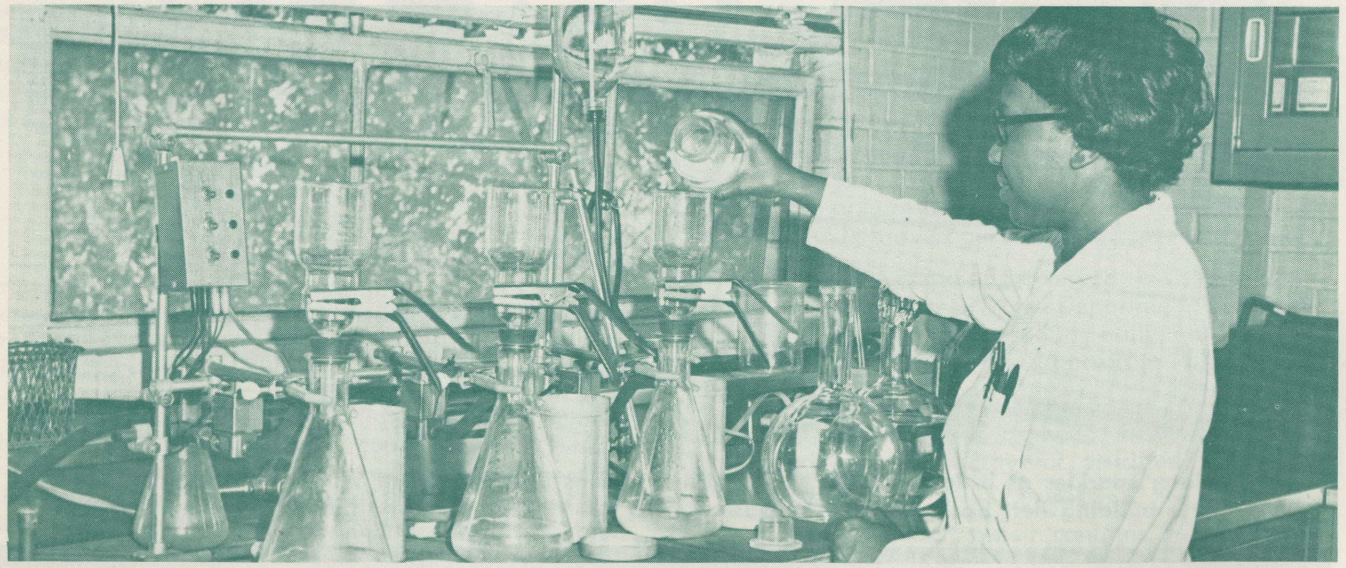
Queen Lane: (1) Pre-chlorination to free chlorine residual, (2) settling for 20 hours, (3) application of chemicals—chlorine, ferric chloride, with lime for pH adjustment, and carbon, (4) rapid mixing of chemicals with water. (5) slow mixing of chemicals with water to form "floc," (6) settling, (7) rapid sand filtration, (8) post treatment, including chlorination, fluoridation, lime for pH control, and (for high service and Roxborough express water only) zinc phosphate treatment.

Torresdale: (1) Pre-chlorination to free chlorine residual, or application of chlorine dioxide, (2) pre-sedimentation, (3) application of chemicals—ferric chloride or alum, with lime for pH adjustment, chlorine or chlorine dioxide, and carbon, (4) rapid mixing of chemicals with water, (5) slow mixing of chemicals with water to form "floc," (6) settling, (7) rapid sand filtration, (8) post treatment, including chlorination and fluoridation; also pH for adjustment with lime when required.

All water withdrawn from the East Park and Oak Lane Reservoirs is rechlorinated before entering the distribution system. East Park water is treated with chlorine dioxide through the spring, summer and autumn to control algae.

Quality Control: The Water Department guards the quality of its water, from the river to the home faucet. Along the rivers, it maintains electronic monitoring stations and also collects river water samples by boat. In the plants, laboratory personnel check the water at every treatment stage, and this is followed by regular sampling of 85 points in the distribution system. Laboratories make 750,000 wet chemical tests on water each year, and the equivalent of hundreds of thousands of other tests by electronic testing devices.

The city's drinking water, in its finished form, meets or surpasses all of the quality standards of the U.S. Public Health Service, and meets most of the very strict quality goals of the American Water Works Association. It is rated as one of the purest treated waters in America.



Modern laboratories ensure pure, safe, and palatable drinking water. They make 750,000 "wet chemical" tests and hundreds of thousands of instrumental tests on water samples yearly.

1801: Steam Pumps Supplied Water

Philadelphia's water system began with a bold experiment.

At a time when steam power was finding its first uses in America, the City Fathers opened two steam pumping stations in January, 1801. These water works represented the first large scale application of steam pumping to water service in this country.

The new system was the brain child of Benjamin Henry Latrobe, an immigrant British engineer, who later designed the Capitol in Washington.

One of Latrobe's stations was located just north of Chestnut Street near the Schuylkill River. The water flowed into a pit under the station, and a steam engine raised it about 40 feet into a brick conduit, which ran down Chestnut Street to Broad Street and then turned north to Centre (now Penn) Square.

The other station, situated in the middle of Centre Square where City Hall now stands, received the water and raised it by steam power to two wooden tanks that were 40 feet about the ground. These tanks, which held 17,660 gallons, were the city's only reservoir.

Wood was the prime building material at the stations. Not only were the pipes of wood, but also such items as the pumps and engines, flywheels, and piston shafts. Even the fireboxes of the coal burning engines were of wood, with iron plates for lining.

The Centre Square pumping unit was of the walking-beam type and operated on steam pressures of two to four pounds per square inch. The cylinders were of wood, bound with iron bands. Cast-iron flues were immersed in water to produce the steam.

The steam engines in both the Centre Square and Schuylkill Works were modified versions of the "atmospheric" type, developed in Europe. These depended essentially upon the condensation of steam to create a vacuum in order to drive a piston.

The total cost of the new works from 1799 (when construction started) through 1803 was $295,352, and it was many years before annual revenues began to pay for operating costs alone. During the first year of operation, the water works distributed less than one-half million gallons of water daily.

Latrobe's stations operated until 1815. The Centre Square buildings were taken down in 1829.

OLD FAIRMOUNT WATER WORKS

By 1812 the City Fathers had grown disgusted with the expense of keeping the wooden pumps running at Centre Square. Water service too was frequently interrupted by insufficient storage.

As a result, the city built a new water works at "Fair Mount" near Morris Hill. A series of graceful buildings rose, with slender columns and a wide terrace fronting on the Schuylkill River. The new works became a classic example of the Greek Revival style, popular in the early 19th century.

The Centre Square Works was one of two steam-powered pumping stations opened by Philadelphia in 1801 to supply water.

From the beginning of the Fairmount Station and through much of its subsequent evolution, Frederick Graff, eminent engineer, was the guiding spirit. His son, Frederick, Jr., carried on his work after his death in 1847.

When the new works went into service on September 7, 1815, water was raised to an earthen reservoir on the hill now occupied by the Museum of Art. From the reservoir the water flowed by gravity to city houses.

At first two steam engines were used. One of these was developed by Oliver Evans, a self-taught genius from New Jersey who also created the first steam-powered, self-moving amphibious vehicle. Evans had made a remarkable improvement in the steam engine. He used the steam to drive the piston directly, thus reducing the weight of the engine and eliminating the need for a steam-created vacuum.

Unfortunately, the boiler of Evans' high-pressure engine burst at Fairmount in 1818, and the City Fathers turned to much cheaper water-wheel power. The large water storage possible on the hill next to Fairmount strengthened this decision.

A dam was thrown across the Schuylkill River to form a fresh water pool, and new paddle wheels and pumps were built just below the pool level. River water was conducted into a forebay on the back and east side of the mill buildings, and it was then led through flumes to turn the wheels.

The new water-driven works — the first of its type built for public water service in any large American city—went into operation July 1, 1822.

From Water Wheels And Wooden Mains

As the city grew, additional paddle wheels were installed at Fairmount, and additional basins were created on the neighboring hill. By 1842, there were eight paddle wheels supplying water to four basins through double-acting force pumps which had been designed by Frederick Graff.

The first water turbine (a French invention by Fourneyron) was installed at Fairmount in 1851, and by 1871 all of the paddle wheels had been replaced by turbines. Fairmount Dam was rebuilt in 1842-43.

The Fairmount Station continued to supply portions of the city until March, 1911, when new filtration plants took over all water service. Most machinery was later removed from the station, but the original 1851 turbine, with related pump, flywheels, gears, and expansion tank, may still be seen.

19TH CENTURY PIPING

When the Centre Square Station went into service in 1801, water flowed from it through wooden logs to reach center city homes. These logs were bored through the center, and joined end to end by iron bands and caulking.

The wooden mains, however, leaked badly and constantly, and by 1832, the city discontinued laying them. Up to that time it had laid 241,604 feet.

Cast iron mains gradually replaced the old logs. The first 400 feet of cast iron pipe was imported from England in 1817, and by 1852 the city proper had 440,403 feet of cast iron mains in service. By the 1850's wooden mains were no longer in use, although many of them were not actually removed from the ground.

Philadelphia's water system today has 3,200 miles of mains, most of them cast iron but with an increasing proportion of ductile iron and steel pipe. A few old mains laid in the 1830's and 1840's are still in service.

OTHER PUMPING STATIONS

Pumping water from the rivers to raised reservoirs was the chief method of water supply in 19th century Philadelphia. Although Fairmount was the city's only **water-powered** pumping station, numerous steam-powered stations were built to meet increasing water demand. This was made possible by the steady improvement of the steam engine.

Some of the new stations were built in the 1840's and early 1850's by townships or districts outside the city. In 1854, however, all outlying areas in Philadelphia county were merged with the city, and the latter took over their water works. The city itself built new stations after 1854.

Towards the end of the 19th century, Philadelphia had a half-dozen stations, with related reservoirs, in service. Besides Fairmount, these included Shawmont (1869), Belmont (1872), Spring Garden (1889), Queen Lane (1895), and Frankford (1878). The Delaware Works, built in 1851, at the foot of Susquehanna Avenue on the Delaware River lasted until 1890.

With the 1854 merger, the city also abolished its old Watering Committee and set up a Water Bureau under a chief engineer. This bureau endured until 1952, when the present Water Department, with responsibility for both water and wastewater systems, was established.

EARLY 20TH CENTURY FILTRATION

The chief method of purifying water in 19th century Philadelphia was to provide for quiet periods in the reservoirs. This allowed suspended materials to settle to the bottom.

As the century wore on, however, the water from the Delaware and Schuylkill Rivers became increasingly polluted. Tastes and odors appeared, and the typhoid fever rate rose in the city.

Between 1858 and 1899, seven special studies were made of water sources and treatment. As a result of the 1899 report, the City Council authorized the construction of filtration plants.

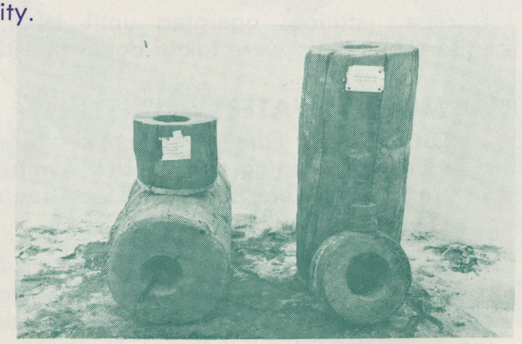
Five new filtration plants — the biggest and finest "slow sand" plants in the world — went into service between 1902 and 1911. The new plants included extensive acreages of sand beds, where the river water was filtered. This filtration was preceded by cleansing in pre-filters of the coke or sponge type, and/or, at a late date, by settling in raw water basins.

Filtration of Philadelphia's water caused a marked drop in typhoid deaths. These quickly fell from an annual average of 60 per 100,000 residents to only one-fourth that number. With the introduction of chlorine treatment in 1913, typhoid was rapidly wiped out.

THE REBIRTH OF THE 1950'S

As the years went by, the lack of public funds handicapped the city's water system. Its proud slow sand plants gradually deteriorated. Though a few rapid sand filters were introduced at the Queen Lane and Belmont Plants in the 1920's and other modifications were made, the plants were unable to keep up with growing water demand. This was also true of the old steam pumping stations.

The city's drinking water had become safe, but tastes and odors persisted. To correct this, activated carbon, ozone, chlorine dioxide, and other treatment chemicals were adopted in the late 1940's and early 1950's. There was an immediate improvement in water quality.



Philadelphia's first wooden mains were made of closely - fitted wooden logs.

With the creation of a self-supporting Water Department in 1952, the long needed funds became available. The department began a $217 million construction program (1952-1976).

To provide better water and meet rising demand, the department built a network of modern treatment plants, pumping stations, covered reservoirs, and hundreds of miles of new mains.

Notable were the treatment plants. Equipped with semi-automatic controls, the new Torresdale Plant was the largest "pubsh-button" rapid-sand plant in America when it was opened in 1959. Similar plants were completed in the 1960's at Queen Lane and Belmont.

With a combined rated capacity of 482 million gallons daily, the new plants supplied abundant water for every customer need. Purifying water extensively, they provided sedimentation, filtration, and chemical treatment in several stages. Modern laboratories and precise "push-button" controls ensured fine water.

During the 1950's, the last steam pumps were removed from pumping stations, and new electric pumps wre installed. Many stations were rebuilt.

In the 1960's, the department created a microwave system, which operates 14 pumping stations from a central point. Reservoirs and some large supply mains are also linked to this system, now monitored by computer.

In future years, automation and other changes will further improve the water system. Over $95 million will be invested in new capital works in the next six years.

WATER SYSTEM CAPACITIES — 1979

PLANT TREATMENT CAPACITIES

(in millions of gallons daily)

	RATED	PEAK RATE
BELMONT PLANT	78	108
QUEEN LANE PLANT	120	150
TORRESDALE PLANT	282	423

PLANT RETENTION CAPACITIES

(in millions of gallons)

		TOTAL
BELMONT PLANT:	Two 36-MG pre-sedimentation basins	72
	Four sedimentation basins	14.2
	Three filtered water basins	38.2
	Filtered water clear well	1.8
QUEEN LANE PLANT:	Pre-sedimentation basin	177
	Four 3-MG upper settling basins	12
	Four 3-MG lower settling basins	12
	Four filtered water basins	90
TORRESDALE PLANT:	Pre-sedimentation basin	176
	Four 10-MG sedimentation basins	40
	Five filtered water basins	193

OTHER RETENTION CAPACITIES

(in millions of gallons)

		TOTAL
UPPER ROXBOROUGH:	Filtered water basins	25.6
LOWER ROXBOROUGH:	Filtered water basins	3
OPEN RESERVOIRS:	East Park (filtered water)	677
	Oak Lane (filtered water)	70
STANDPIPES:	Two 5-MG Somerton tanks	10
	Two 5.5-MG Roxborough tanks	11
	Fox Chase tank	1.5

PUMPING STATION CAPACITIES

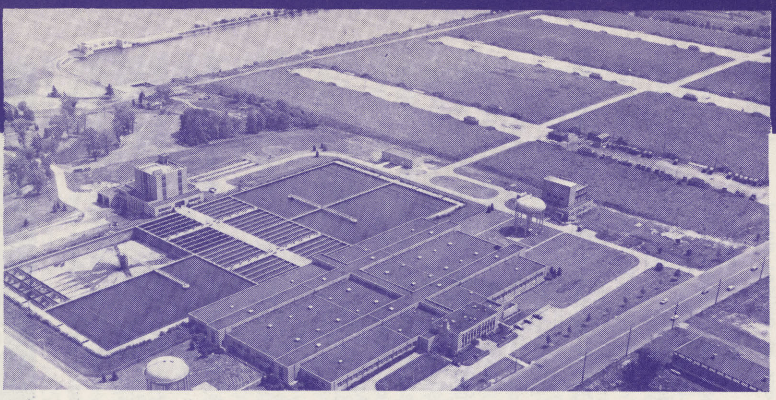
(in millions of gallons daily)

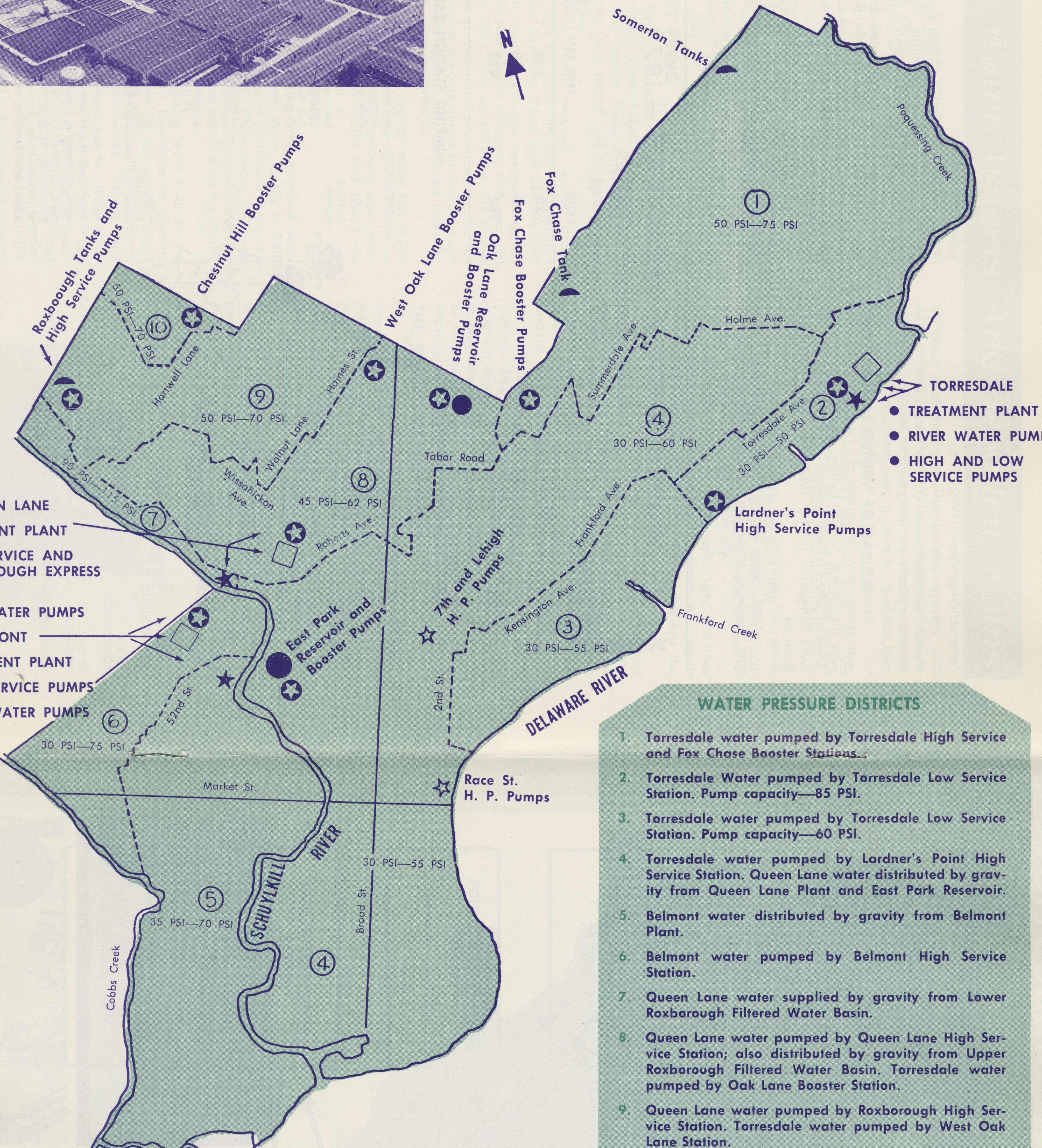
		TOTAL
RAW WATER:	Belmont Station (Schuylkill)	140
	Queen Lane Station (Schuylkill)	200
	Torresdale Station (Delaware)	480
FILTERED WATER:	1. Treated Schuylkill Water	
	Belmont High Service Station	42
	Chestnut Hill Booster Station	8.5
	East Park Booster Station	75
	Queen Lane High Service Station	77.5
	Roxborough High Service Station	45
	2. Treated Delaware Water	
	Fox Chase Booster Station	25.3
	Lardner's Point Station	240
	Oak Lane High Service Station	50
	Torresdale High and Low Service Station (200 MGD low, 80 MGD high)	280
	West Oak Lane Booster Station	27.5
HIGH PRESSURE:	Fairhill Station	21.6
	Race Street Station	21.6

(Each high pressure station can pump 15,000 gallons per minute)

NOTE: At each stage, the combined capacities of the water system facilities (whether treatment plants, reservoirs, or pumping stations) are much greater than average daily demand by consumers. This enables the Water Department to meet emergencies, to supply peak needs at certain hours or seasons, and to continue operation when some facilities have to be taken out of service.

....To An Automated Water System





WATER PRESSURE DISTRICTS

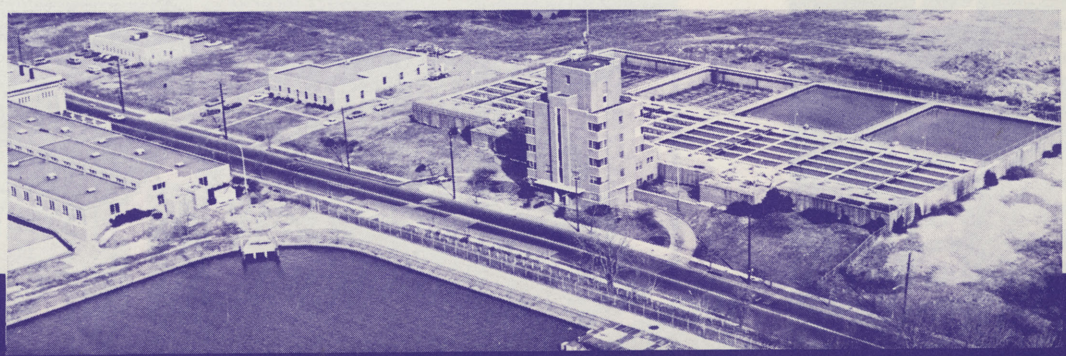
1. Torresdale water pumped by Torresdale High Service and Fox Chase Booster Stations.
2. Torresdale Water pumped by Torresdale Low Service Station. Pump capacity—85 PSI.
3. Torresdale water pumped by Torresdale Low Service Station. Pump capacity—60 PSI.
4. Torresdale water pumped by Lardner's Point High Service Station. Queen Lane water distributed by gravity from Queen Lane Plant and East Park Reservoir.
5. Belmont water distributed by gravity from Belmont Plant.
6. Belmont water pumped by Belmont High Service Station.
7. Queen Lane water supplied by gravity from Lower Roxborough Filtered Water Basin.
8. Queen Lane water pumped by Queen Lane High Service Station; also distributed by gravity from Upper Roxborough Filtered Water Basin. Torresdale water pumped by Oak Lane Booster Station.
9. Queen Lane water pumped by Roxborough High Service Station. Torresdale water pumped by West Oak Lane Station.
10. Either Torresdale or Queen Lane water pumped by Chestnut Hill Booster Station from April through November. At other times, the district is supplied directly by the Roxborough and West Oak Lane Stations.

Note on Water Pressures: The normal range of water pressures, as received by customers, is shown on the map for each district. Thus 50 PSI—75 PSI (for District 1) denotes a pressure range of 50 to 75 pounds per square inch.

KEY

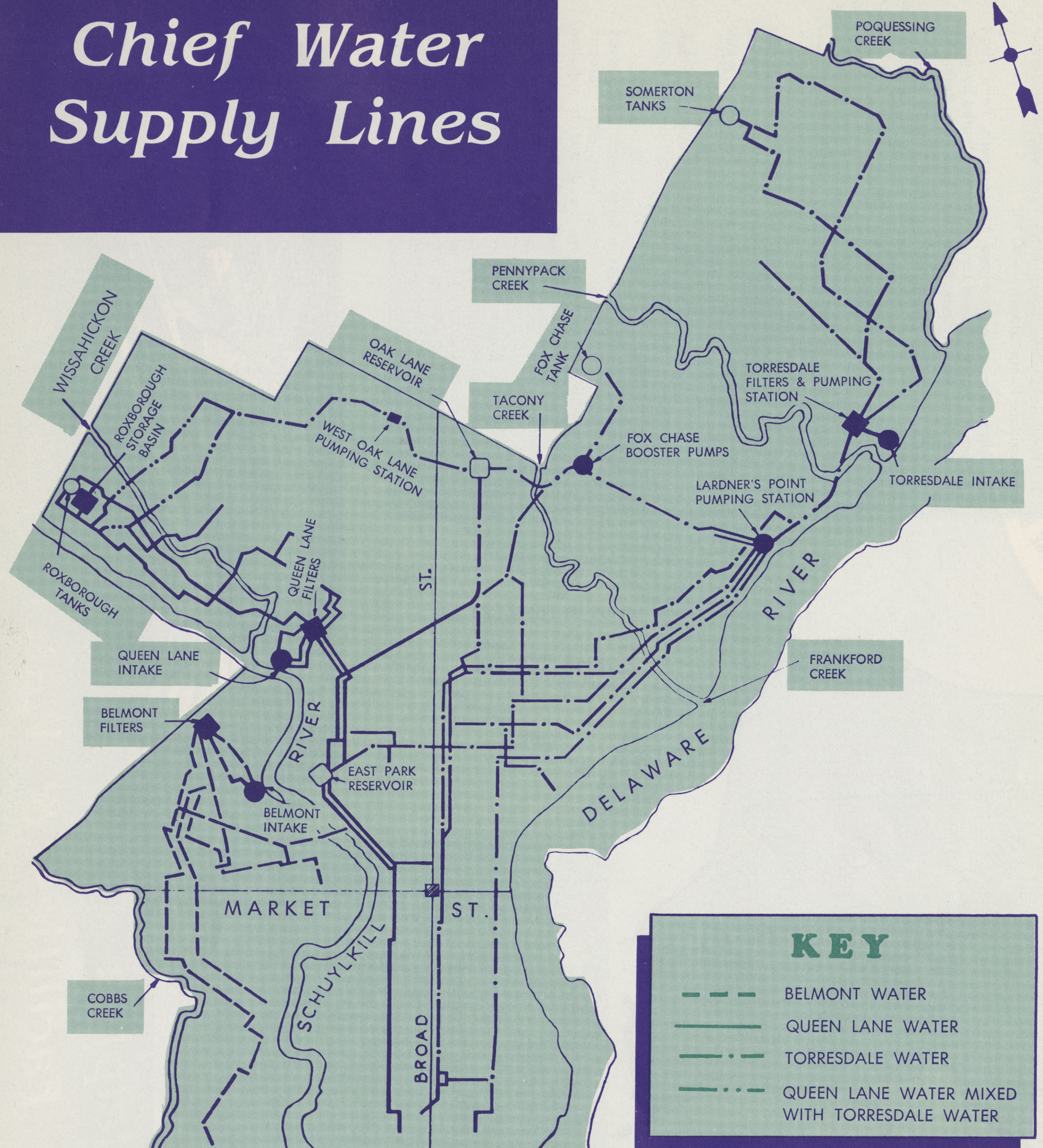
- □ Treatment Plants
- ★ River Water Pumping Stations
- ✪ Filtered Water Pumping Stations
- ☆ High Pressure Pumping Stations (for fire protection only)
- ◓ Tanks for Filtered Water
- ● Open Reservoirs for Filtered Water

Note: There are also underground basins for filtered water at each treatment plant and in Upper Roxborough.

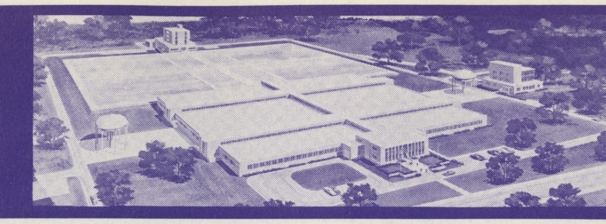


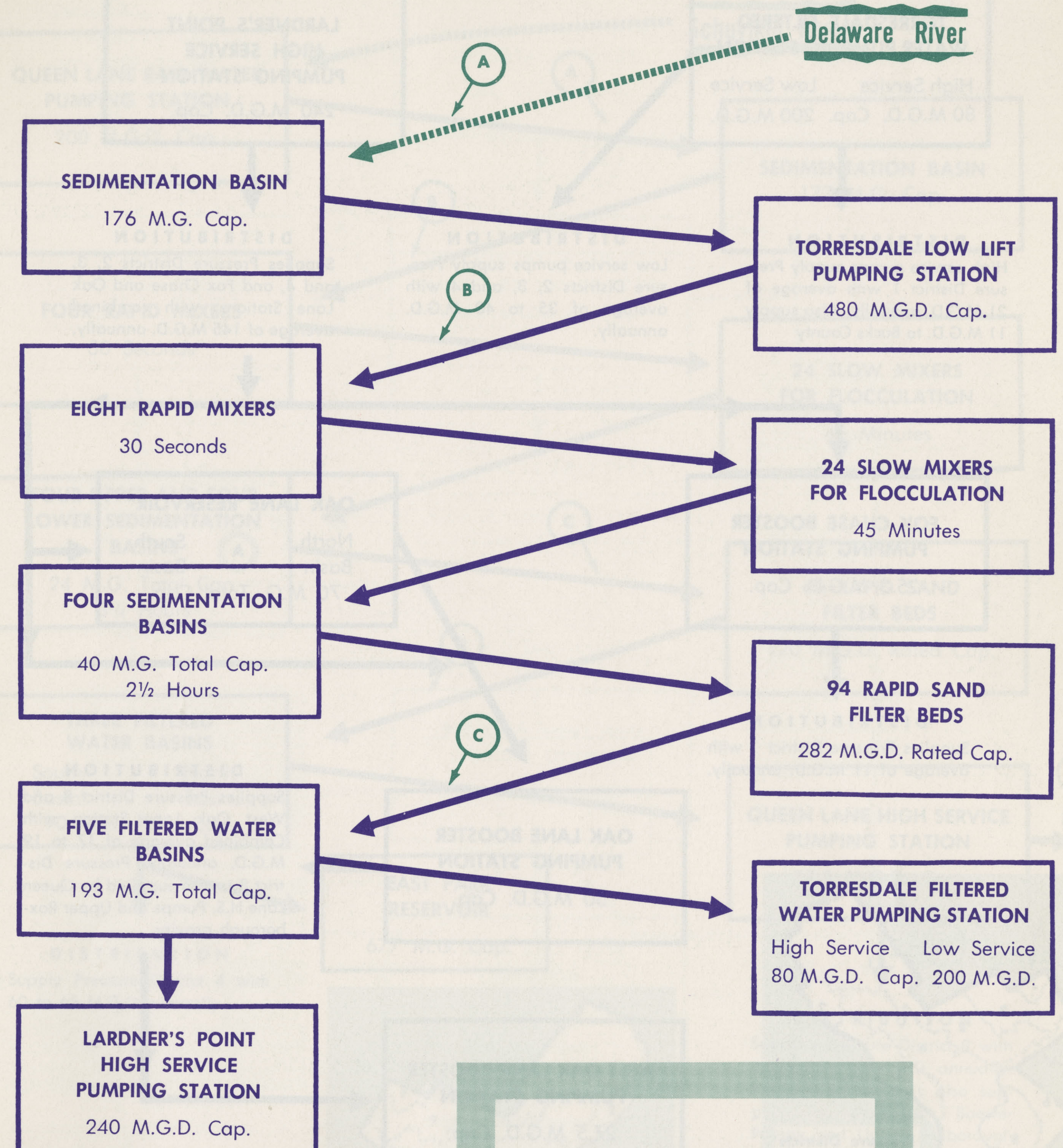
Philadelphia Water Facilities & Water Pressure Districts

Chief Water Supply Lines



Torresdale Water Treatment Plant

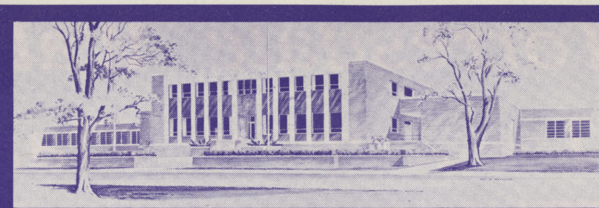




CHEMICALS APPLIED

A—Chlorine or chlorine dioxide
B—Ferric chloride, alum, lime, carbon, chlorine or chlorine dioxide
C—Lime, fluoride, chlorine or chlorine dioxide

Distribution From Torresdale



TORRESDALE FILTERED WATER PUMPING STATION
High Service 80 M.G.D. Cap.
Low Service 200 M.G.D.

LARDNER'S POINT HIGH SERVICE PUMPING STATION
240 M.G.D. Cap.

DISTRIBUTION
High service pumps supply Pressure District 1 with average of 21 M.G.D. annually. Also supply 11 M.G.D. to Bucks County

DISTRIBUTION
Low service pumps supply Pressure Districts 2, 3, and 4 with average of 35 to 40 M.G.D. annually.

DISTRIBUTION
Supplies Pressure Districts 2, 3, and 4, and Fox Chase and Oak Lane Stations, with combined average of 145 M.G.D. annually.

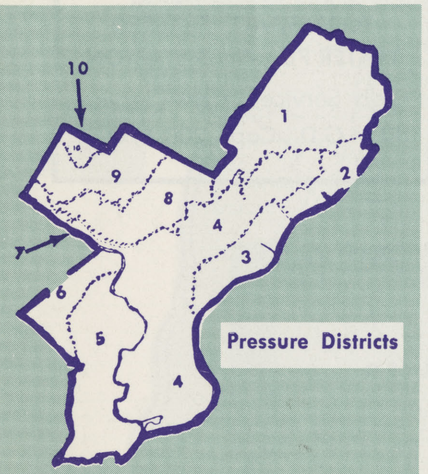
FOX CHASE BOOSTER PUMPING STATION
25.3 M.G.D. Cap.

OAK LANE RESERVOIR
North Basin (A) South Basin
70 M.G. Total Cap.

DISTRIBUTION
Supplies Pressure District 1 with average of 11 M.G.D. annually.

OAK LANE BOOSTER PUMPING STATION
50 M.G.D. Cap.

DISTRIBUTION
Supplies Pressure District 8 and West Oak Lane Station with Combined average of 17 to 19 M.G.D. annually. Pressure District 8 is also supplied by Queen Lane H.S. Pumps and Upper Roxborough gravity.

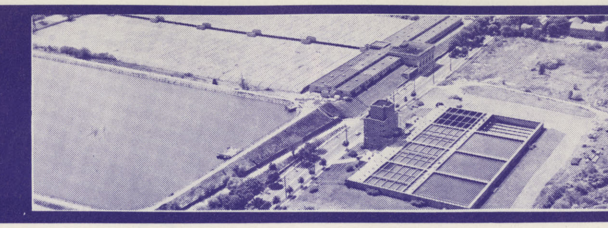


WEST OAK LANE BOOSTER PUMPING STATION
27.5 M.G.D. Cap.

DISTRIBUTION
Supplies Pressure District 9, 10, with 8 to 9 M.G.D. annually.

CHEMICALS APPLIED
A—Chlorine or chlorine dioxide

Queen Lane Water Treatment Plant



Schuylkill River

QUEEN LANE RAW WATER PUMPING STATION
200 M.G.D. Cap.

(A)

SEDIMENTATION BASIN
177 M.G. Cap.

(B)

FOUR RAPID MIXERS
30 Seconds

24 SLOW MIXERS FOR FLOCCULATION
45 Minutes

FOUR UPPER AND FOUR LOWER SEDIMENTATION BASINS
24 M.G. Total Cap.
3¼ Hours

(C)

40 RAPID SAND FILTER BEDS
120 M.G.D. Rated Cap.

(D)

THREE FILTERED WATER BASINS
South Basin North Basins
90 M.G. Total Cap.

QUEEN LANE HIGH SERVICE PUMPING STATION
77.5 M.G.D. Cap.

(E)

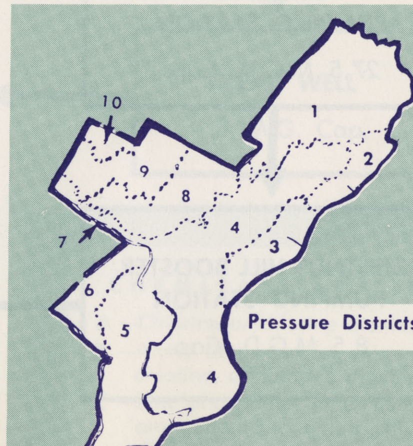
EAST PARK RESERVOIR
677 M.G. Cap.

DISTRIBUTION
Supply Pressure District 4 with 60 to 65 M.G.D. annually.

(E)

DISTRIBUTION
Supplies Pressure District 8 with average of 10 M.G.D. annually. Pressure District 8 is also supplied by Oak Lane Booster Pumps and Upper Roxborough gravity.

CHEMICALS APPLIED
A —Chlorine
B —Alum, chlorine, lime, carbon,
C —Chlorine or sulfur dioxide
D —Chlorine, fluoride,
E —Zinc phosphate



DISTRIBUTION
Supplies Upper Roxborough Filtered Water Basins with average of 22 to 23 M.G.D. annually.

Distribution From Roxborough

CHEMICALS APPLIED
A —Chlorine

QUEEN LANE HIGH SERVICE PUMPING STATION
77.5 M.G.D. Cap.

UPPER ROXBOROUGH FILTERED WATER BASINS
25.6 M.G. Total Cap.

ROXBOROUGH HIGH SERVICE PUMPING STATION
45 M.G.D. Cap.

LOWER ROXBOROUGH FILTERED WATER BASIN
3 M.G. Cap.

A

A

A

DISTRIBUTION
To Pressure District 8 (also supplied by Queen Lane H.S. and Oak Lane Booster Pumps).

DISTRIBUTION
To Pressure District 7.

COMBINED DISTRIBUTION
Averages 12 M.G.D. annually.

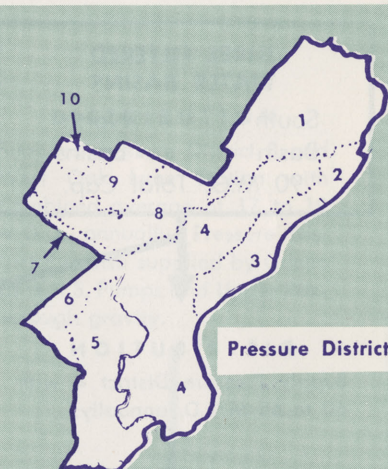
TORRESDALE WATER

OAK LANE BOOSTER PUMPING STATION
50 M.G.D. Cap.

WEST OAK LANE BOOSTER PUMPING STATION
27.5 M.G.D. Cap.

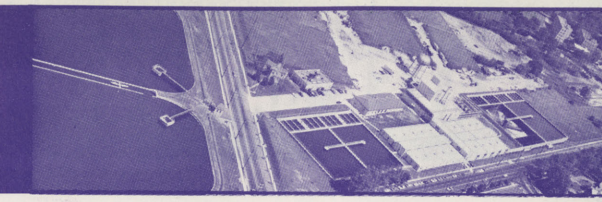
CHESTNUT HILL BOOSTER PUMPING STATION
8.5 M.G.D. Cap.

DISTRIBUTION
Supply average of 20 M.G.D. annually to Pressure Districts 9 and 10. About 8 to 9 M.G.D. of this is from West Oak Lane, and the rest from Roxborough Pumps.



DISTRIBUTION
To Pressure District 10. No water has been distributed from the Chestnut Hill Station for several years. Station is used for standby.

Belmont Water Treatment Plant



Schuylkill River

BELMONT RAW WATER PUMPING STATION
140 M.G.D. Cap.

A

TWO SEDIMENTATION BASINS
72 M.G. Total Cap.

B

SIX RAPID MIXERS
30 Seconds

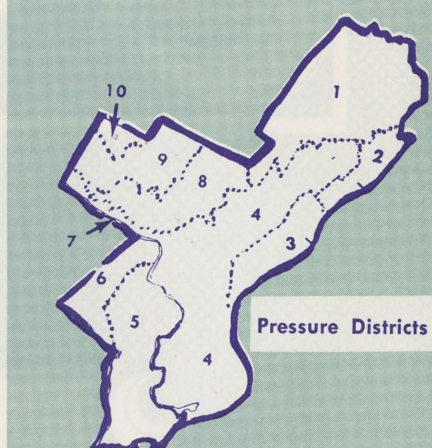
FOUR SLOW MIXERS FOR FLOCCULATION
42 Minutes

FOUR SEDIMENTATION BASINS
14.2 M.G. Cap.
4 to 4.7 Hours

26 RAPID SAND FILTER BEDS
78 M.G.D. Rated Cap.

C

WEIR CHAMBER



BELMONT HIGH SERVICE PUMPING STATION
42 M.G.D. Cap.

CLEAR WELL
1.8 M.G. Cap.

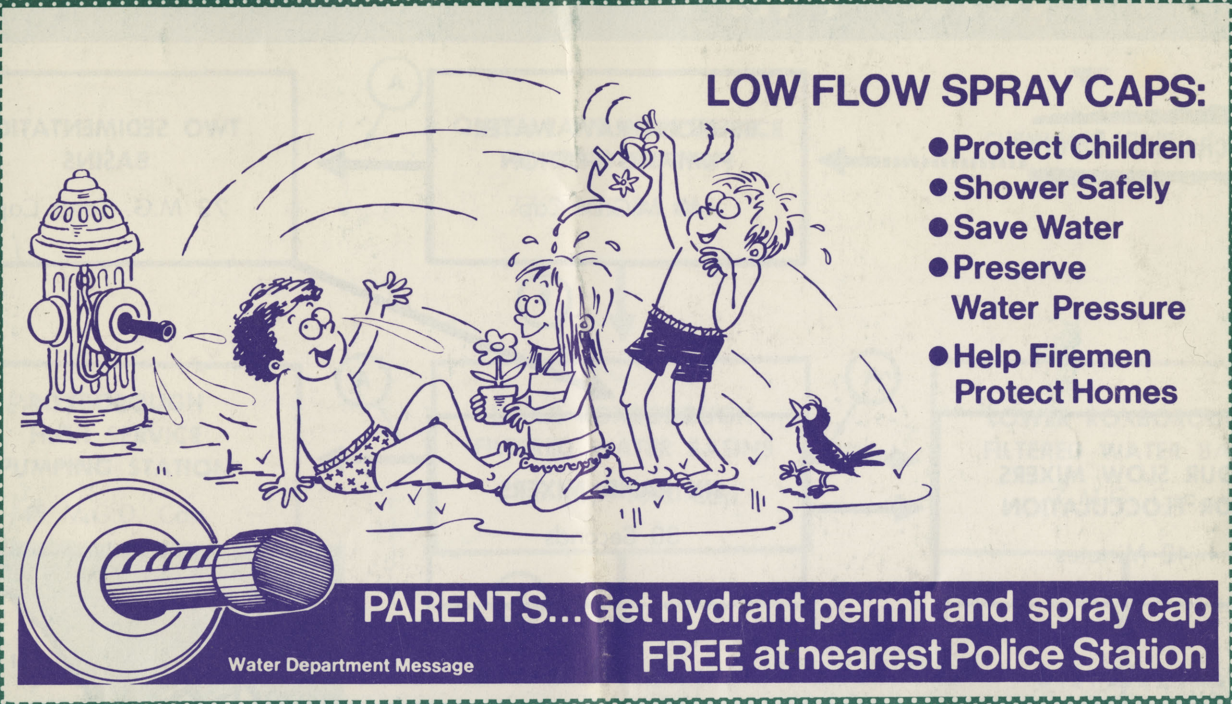
THREE FILTERED WATER BASINS
38.2 M.G. Cap.

DISTRIBUTION
Supplies average of 13 to 14 M.G.D. to Pressure District 6 annually.

CHEMICALS APPLIED
A —Chlorine or chlorine dioxide
B —Alum, lime, carbon, ammonia, chlorine, or chlorine dioxide
C —Zinc phosphate, lime, fluoride, ammonia, chlorine or chlorine dioxide

DISTRIBUTION
Supplies average of 50 M.G.D to Pressure District 5 annually.

A WATER SAVING HINT FOR SUMMER TIME



Published by the

PHILADELPHIA WATER DEPARTMENT

Frank L. Rizzo, Mayor

Hillel S. Levinson, Managing Director

Carmen F. Guarino, Water Commissioner

Raymond J. Harris, Editor

Bernard Rosenberg, Art Layout