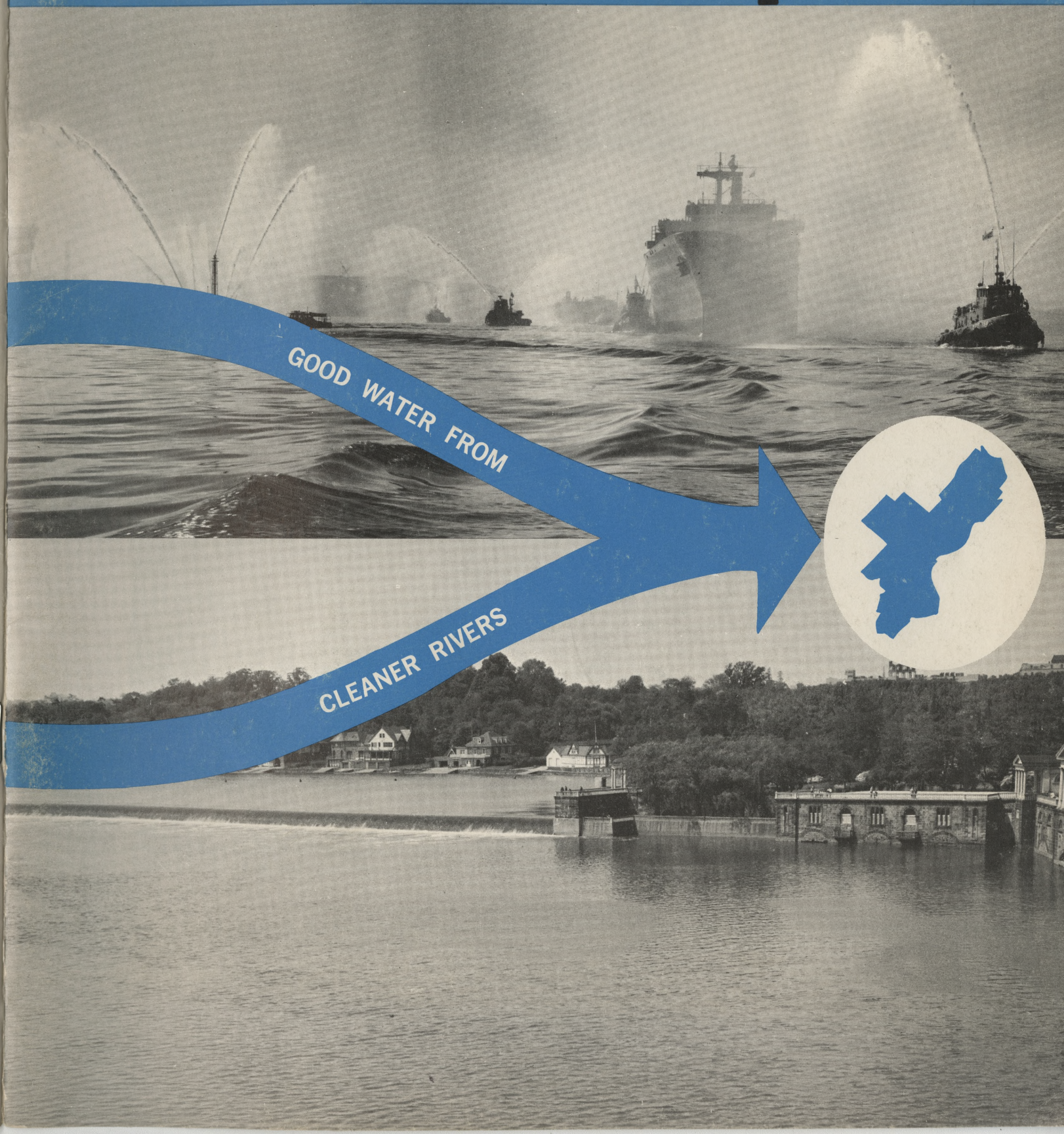
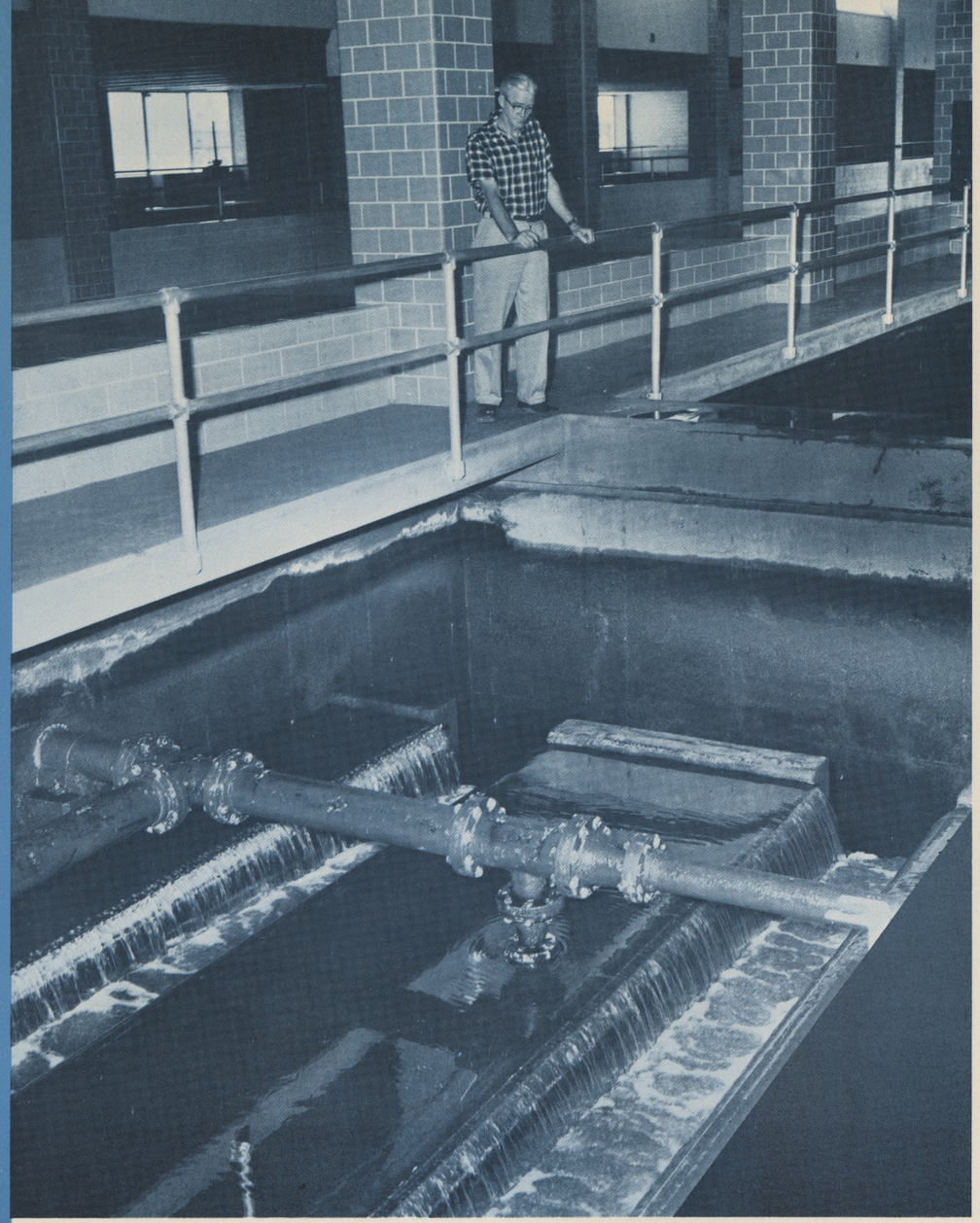
CITY OF PHILADELPHIA
WATER DEPARTMENT

ANNUAL REPORT 1964





New Belmont Plant: Washing of a filter bed at Philadelphia's third push-button water plant, which was still under construction in 1964, symbolizes the modern controls built into the City's water system. Filter beds can be washed with the press of a button.

JAMES H. J. TATE
Mayor

FRED T. CORLETO
Managing Director

SAMUEL S. BAXTER
Commissioner & Chief Engineer

City of Philadelphia

WATER DEPARTMENT

ANNUAL REPORT

1964

Among other things it discusses:

WATER DEPARTMENT

SAMUEL S. BAXTER
Commissioner and Chief Engineer

CHARLES E. VICKERMAN
Deputy Commissioner
Water Operations

B. BARNEY PALMER
Administrative Services Director

WATER OPERATIONS

Division Chiefs

†ELWOOD L. BEAN
Water Treatment

ELMER GOEBEL
Distribution

VICTOR A. PAGNOTTO
Load Control Center

JOSEPH RADZIUL
Research and Development

HENRY F. KALINOSKI
Pumping

ROBERT F. WALKER
Customer Service

W. FRANK SCOTT
Water Main Records

WILLIAM SNYDER
Automotive Maintenance

SEWAGE OPERATIONS

CARMEN GUARINO
Chief, Sewage Operations

Division Chiefs

RALPH A. HOOT
Sewage Treatment

ABRAHAM L. BARMISH
Sewer Maintenance

JACOB S. REICH
Industrial Wastes

EUGENE V. BONNER
Sewer Records and Information

COMMISSIONER'S STAFF

SAMUEL J. SCHWARTZ
Assistant

RAYMOND J. HARRIS
Administrative Assistant

ERVIN L. DAVIS
Executive Assistant

ADMINISTRATIVE SERVICES

††THOMAS B. MULLINEAUX
Chief, Fiscal Division

FLOYD PLATTON
Acting Personnel Officer

LEIGH B. HEBB
Fiscal Officer

JACOB BALK
Meter Shop

ENGINEERING

JOHN BRIGGS
Assistant Chief Engineer

Division Chiefs

ABRAHAM FINKELSTEIN
Design

*SAMUEL K. WILSON
Construction

JAMES A. BRADY, JR.
Projects Control

WILLIAM R. CROOKS
Testing Laboratory

*Resigned October 14, 1964. Replaced by Kenneth Zitomer as acting chief.

†Sub Chiefs: John Dillener, Delaware Filters; Robert J. Waters, Schuylkill Filters; Charles Pierce, acting chief, Quality Control.

††Deceased December 18, 1964. Replaced by Leigh Hebb as acting chief.

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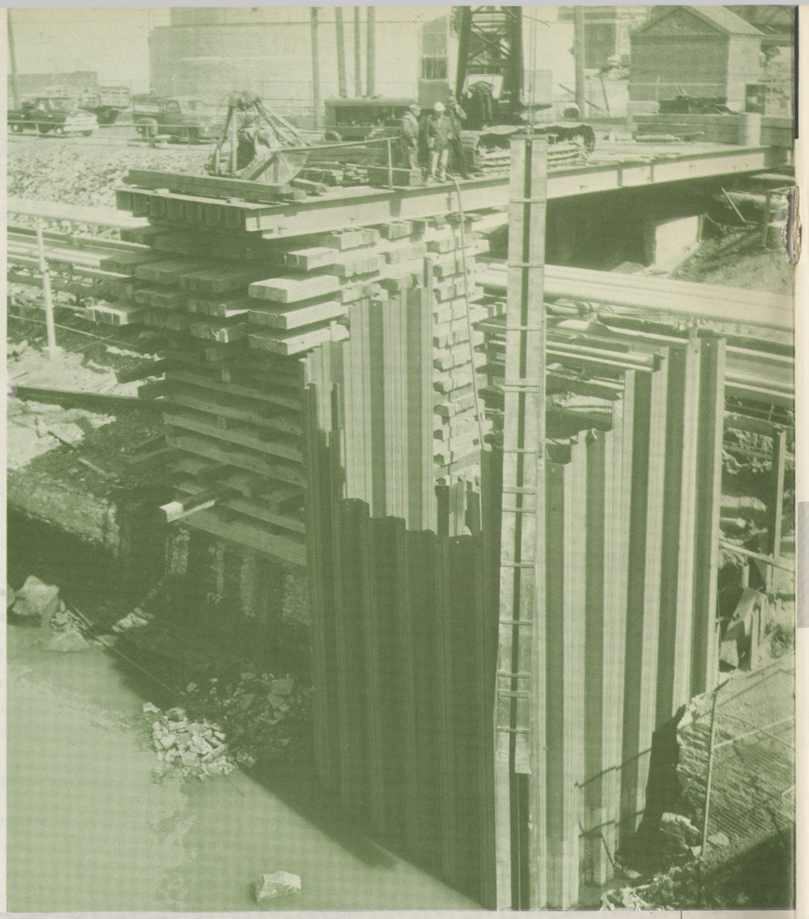
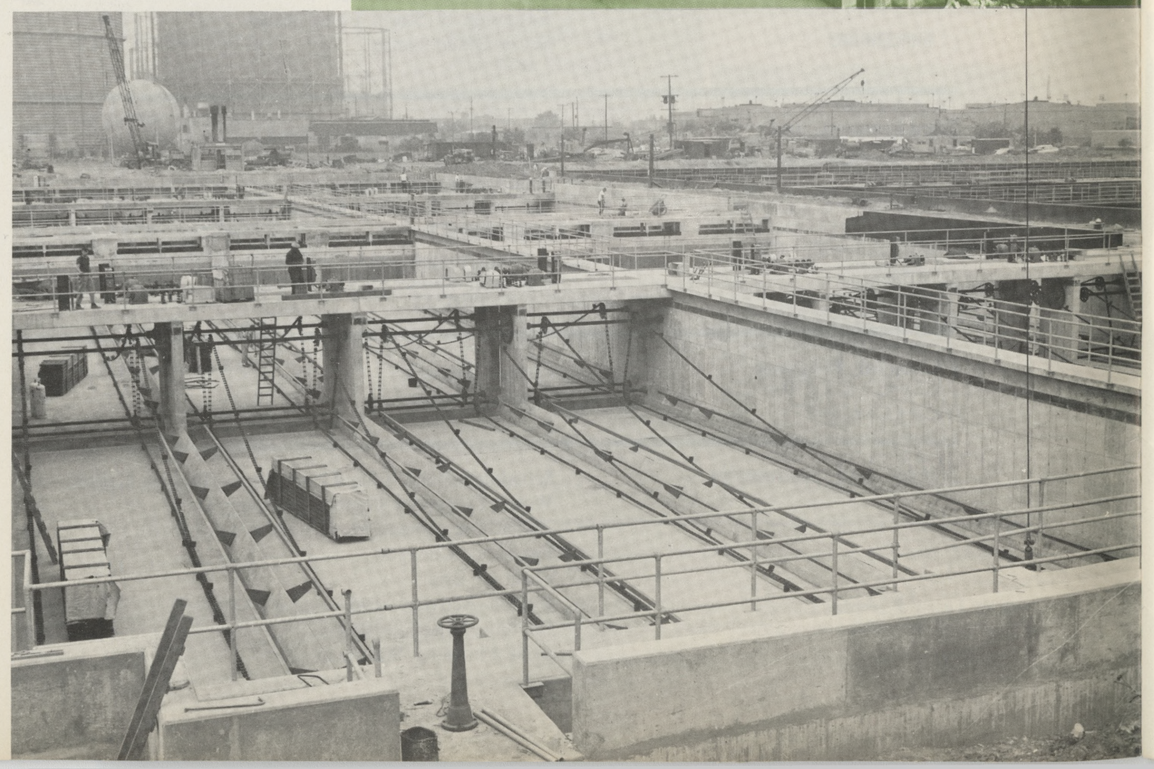
For Storm Relief: Steel piling was driven into the bank of the Schuylkill River where a new $3 million sewer will pour storm water into that stream. An outlet chamber was built inside the piling, which was then removed.



For Stream Protection: New concrete settling tanks neared completion at the Northeast Sewage Treatment Works as part of a $5.3 million plant expansion to protect the Delaware River.



HIGHLIGHTS OF 1964

Philadelphia's master plan for improving its water supply was no longer a vision in 1964. A decade and a half of effort had created one of the finest public water supplies in America.

As part of this effort, the city had invested $380 million* in the clean-up of neighboring streams and the building of modern water supply facilities. By 1964, its water and sewage facilities had a replacement value of $1 billion.

Under the city's master plan, the elements of this huge investment were carefully balanced. The new facilities formed a continuous chain—a chain that protected the rivers from wastes, and then purified, pumped, stored, distributed, and monitored the river water, at maximum efficiency. At each link of the chain, the plan called for the improvement or protection of the city's water.

Recognizing the interdependence of water and sewage facilities, Philadelphia had built (or nearly completed) three new water treatment plants, three modern sewage treatment works, and large complexes of related pumping stations, reservoirs, tanks, water mains, sewers, and electronic monitoring devices.

These advances—together with the extensive stream improvement efforts of other Delaware Valley communities and public entities—were producing many benefits for Philadelphians. The city's residents now enjoyed—

- One of the purest treated waters in America, largely devoid of the tastes, odors, and—to an increasing extent—of the discoloration that once plagued it
- Increasingly protected supplies from the greatly improved Delaware and Schuylkill Rivers
- Reliable, efficient service by modern facilities
- An abundance of water for all possible needs—an abundance that would continue for decades to come

For Philadelphia's economic life, the improved water supply was vital. Thanks to the many improvements, local industry would have plenty of good water for years to come, and the cleaner Port of Philadelphia could continue to attract new shipping. Both the Delaware and Schuylkill Rivers were more suitable for recreation.

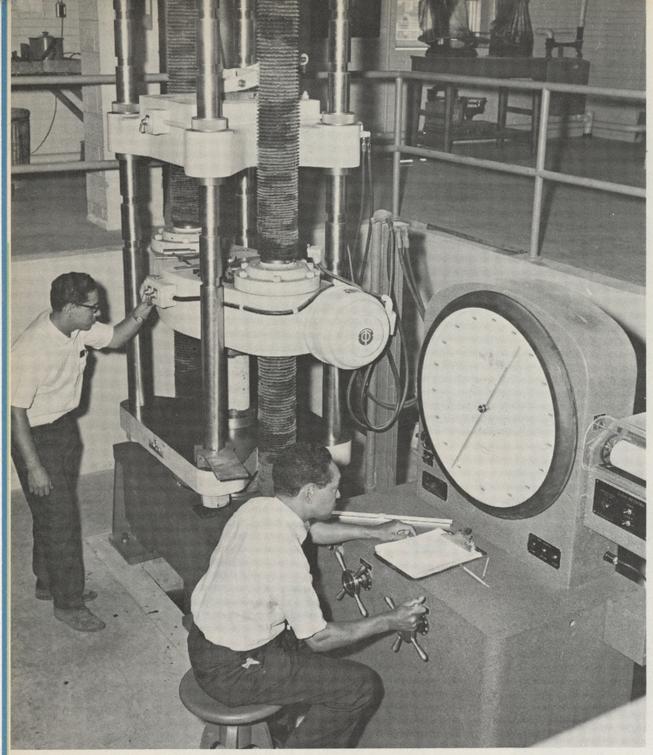
Guiding the changes in the water and sewage systems is the Philadelphia Water Department, which was established in 1952 as a self-supporting public utility. In 1964, the department made these further advances—

1. The new Belmont Water Treatment Plant was 80% finished and moving toward a summer, 1965, opening. Third in a series of semi-automatic, rapid sand plants built by the city, the $10.4 million Belmont Plant will provide 400,000 West Philadelphians with water as fine as that now supplied to other consumers.

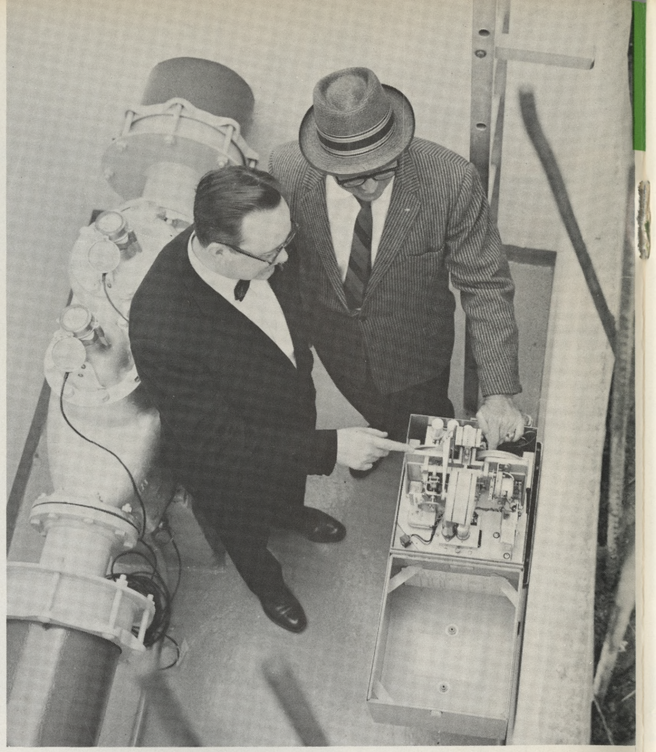
2. New underground reservoirs were being built near the Torresdale Water Treatment Plant. Intended to hold 138 million gallons of filtered water, the reservoirs will offer the city a protected supply in emergencies. They will also provide additional storage to meet the peak demands of water customers.

3. New intake facilities, valued at $2.1 million, were started along the Delaware River to supply river water to the Torresdale Plant.

*Nearly $118 million more is scheduled for the period 1965-70. See table on page 83.



For Better Testing: New giant compression machine went into service in spacious new quarters of the Materials Testing Laboratory. The laboratory tests City purchases.



Water Study: To meet future needs, department experts studied water use habits of two typical neighborhoods. Master meters and tape recorders under street noted water flow into neighborhoods.

For Better Service: Six new pumps at the Queen Lane Filtered Water Pumping Station provided improved service for Northwest customers.

4. Pumping capacities rose at the Queen Lane Filtered Water and Fox Chase Booster Pumping Stations, where modernization was completed. Sizable improvements were also under way at two other stations, the last of 15 water pumping stations to be completely modernized.

5. Nearly 41 miles of new water mains were built to improve the reliability and flexibility of water service. The water main network as a whole grew to 3,158 miles. Many old mains were cleaned and cement lined.

6. At the Northeast Sewage Treatment Works, a $5.3 million expansion was nearly finished. Several new tanks went into service, raising the plant's treatment capacity to 175 million gallons daily—an increase of 50 million gallons. This increase will ensure continued protection of the Delaware River from untreated Philadelphia sewage in future years.

7. Stream clean-up and protection were also aided in other ways during the year. Various operational improvements, through construction of new facilities, were made at the Southeast and Southwest Sewage Treatment Plants. In addition, several large intercepting sewers were built to pick up sewage from branch sewers and divert it to the sewage treatment plants. All types of city sewers expanded by nearly 38 miles.

8. More efficient control of storm flooding was in sight in some areas of the city as construction progressed on three giant storm water sewers. A new storm water pumping station was also ready.

9. The city's half-million water meters were in top condition as the Water Department completed the first 10-year rotation and overhaul of every water meter in its system.

In terms of dollars, the improvement of the city's water supply moved more swiftly in 1964 than in a number of years. The Water Department built facilities valued at $32.9 million, or $9.6 million more than in 1963. Chiefly accounting for the value rise was the expansion of the Northeast Sewage Treatment Works and greatly increased sewer construction.

In bookkeeping terms, the department actually paid out $33.1 million for capital projects in 1964, while total "net capital activity" for the year—the book value of projects started, under way, or completed—amounted to $55.7 million. At the end of the year, the department had $22.6 million of encumbrances on its books. Nearly $20.4 million of contracts were awarded during the year.

Dollars, however, were only one measure of the value of the new or modernized capital facilities. More important were the steady increase in plant efficiency and the trend toward savings in operating costs.

Efficiency and cost savings were emphasized in several ways in 1964—

1. In line with a growing program, the department automated more of its facilities. Besides constructing a third "push-button" water plant, it brought two additional water pumping stations under central microwave control, thus giving the city eleven remotely controlled, automatic, unmanned stations. In addition, push-button features were being included in the new intake facilities and the new reservoirs at Torresdale. Plans were being made to automate other water supply facilities and to make pilot studies for the automating of sewage treatment.

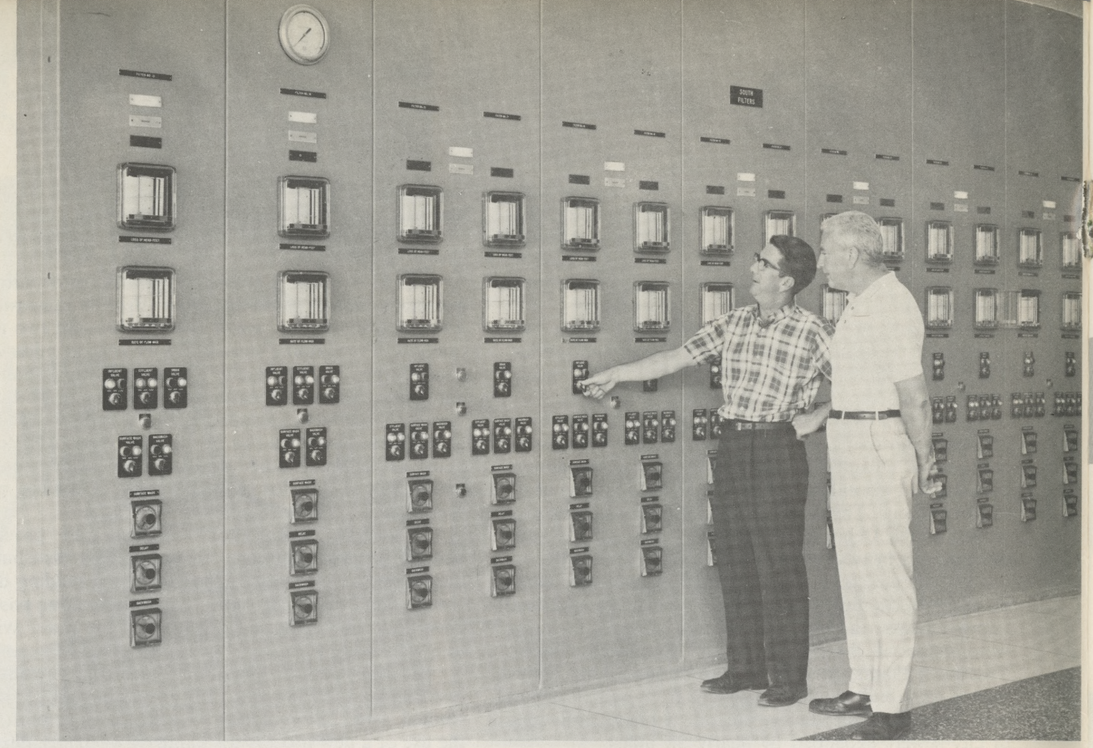
The new "push-button" controls were providing better regulation of water treatment and distribution; they were reducing some labor costs and holding down certain other operating costs; they were making possible faster and more centralized control of the water system as a whole.

2. The department's multi-faceted programs of research were further extended. Departmental personnel studied water consumption in selected neighborhoods, the use of a new process for lining water mains, changes of water quality in the rivers, better control and selection of chemicals in water treatment plants, and the effects of storms and pollution on small creeks. These studies, and others long under way, were intended to find better methods, improve the design of facilities, and throw light on future problems.

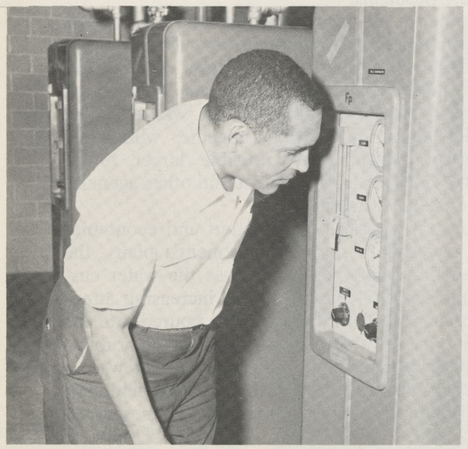
3. Another of the department's laboratories moved into newly built, more efficient quarters. This was the Materials Testing Laboratory, which tests construction materials furnished under city contracts, as well as many products bought by the City. It was expected that the new laboratory quarters, together with some new equipment, would make possible larger future economies for the Water Department and other agencies of the municipal government.

Though new physical construction and economies occupied a large place in the department's plans, the intended beneficiary of these plans was the water customer himself. In 1964, he was given increasing attention. More than 132,000 customer calls poured into the Customer Service unit by telephone and radio, bringing rapid response by inspectors and emergency crews.

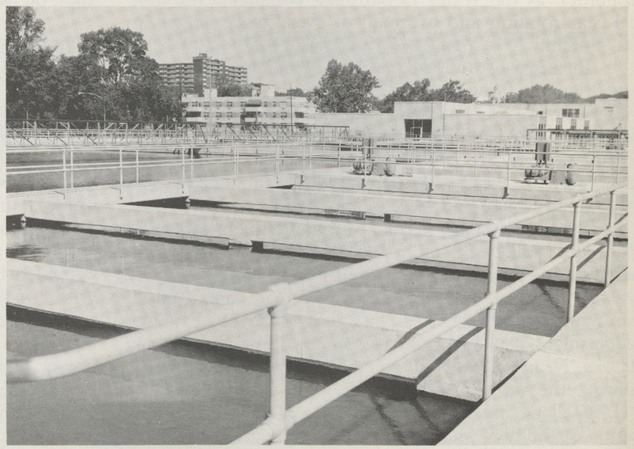
At the end of the year, two million Philadelphians were receiving finer water, together with better service, than in several generations.



Push-button Plant: Electronic panelboards for the control of operations are an omnipresent sight in the new Belmont Plant. This board regulates the rate of water flow through 14 rapid sand filter beds. A press of a button will also wash any of the beds.



Modern Equipment: Chlorinators are among numerous pieces of automatic and semi-automatic equipment in the Belmont Plant. Various chemicals are applied to water flowing under chemical building.



Basins: Slow mixing and settling basins on south side of new plant went into service in 1964, while construction of basins on north side got under way. Carefully controlled basins will provide better water.

BELMONT: ADVANCED FEATURES OF NEWEST PLANT ASSURE FINE WATER

THE WATER SYSTEM

A MODERN SYSTEM FOR FUTURE NEEDS

Philadelphians consumed 120 billion gallons† of water in 1964, but the city's improved water system could have supplied them with much more.

Though water consumption has varied little for several years, the water system was being shaped to meet future community needs. These needs are expected to grow in future years in line with nation-wide trends.

The new system, however, was also an answer to present needs. It was treating and delivering better water, at higher pressures, than ever before. In contrast to the antiquated facilities of a decade before, the new facilities were reliable and efficient, providing a dependable water supply. Gone were the inadequate plants and pumping stations, and the resulting reductions in water flow. Modernization, under a $191 million program (1946-70), had enlarged and strengthened the water system.

The new water system included several strong features:

"Push-button" controls: In the extension of automatic and semi-automatic controls to its plants, pumping stations, reservoirs, and other large facilities, the Philadelphia Water Department was leading much of the American water works industry. This trend, which may result in eventual full automation of some facilities, continued in 1964, with beneficial effects on operating costs and the quality of service (see Highlights, page 5).

Greater flexibility: Thanks to the abundance of the new facilities, the eleven "water pressure" districts (into which the city was divided) were able to provide greater mutual support in emergencies and periods of high water demand. Water from plants and reservoirs could be more freely sent to distant neighborhoods normally supplied through other facilities. There was also greater flexibility of supply within each water pressure district.

Enlarged capacities: Water system capacities were approaching an all time high. Not only were these capacities designed to meet the higher future needs of the city, but they were intended to provide an abundance of reserve strength. This reserve strength will meet the heavy emergency demands that are constantly imposed on the water system.

(1) With a third water plant nearing completion, treatment capacity continued to climb. It was approaching its mid-1965 goal, when the Water Department will be able to treat 480 million gallons of water daily at regular operating rates. This will be 100 million gallons per day more than in 1958. At the same time, the department will have a huge peak capacity that was almost non-existent before. During hours of high demand or in emergencies, it will be able to accelerate its treatment rate to 681 million gallons a day.

(2) Backing up the city's increased treatment capacity was a stronger pumping system. Philadelphia's new and modernized pumping stations had a combined capacity of 1,440 million* gallons daily in 1964—a jump of 213 M.G.D. in 10 years. Pumping capacity climbed by 29.5 M.G.D. during the year, and further increases were planned. By 1966, total capacity will reach 1,500 million gallons daily. Of the latter, 800 million gallons will be filtered water pumping capacity and 700 million gallons raw water.

(3) The department was building or planning underground storage basins that will hold 232 million gallons of purified water. These will raise total storage capacity for purified water to one and one-eighth billion gallons.

New investments in the water system were heavy in 1964. The department continued to extend its water mains, investing $4 million** for this purpose. It also

†Average daily consumption: 327.2 million gallons, or 1 M.G. more than the previous year.

*Includes only stations still operating. Two closed stations no longer needed, because of distribution changes, are excluded. Also excluded are the two modernized "high pressure" stations, whose capacity has been increased but is measured differently.

**Partial and final estimates.

spent $6.1 million** on new plants and pumping stations.

At the end of 1964, work had been completed under 105 contracts, with a combined limit of $6.2 million. Contracts totaling $7.9 million# were awarded during the year, and on December 31 the value of contracts in force was $19 million#.

EXPANSION OF THE WATER TREATMENT PLANTS

By 1964, Philadelphia's eleven "water pressure districts" had been grouped into three great water supply areas—each of them served by a growing cluster of modern facilities. The heart of each cluster was—or would be—a modern, "push-button" water treatment plant.

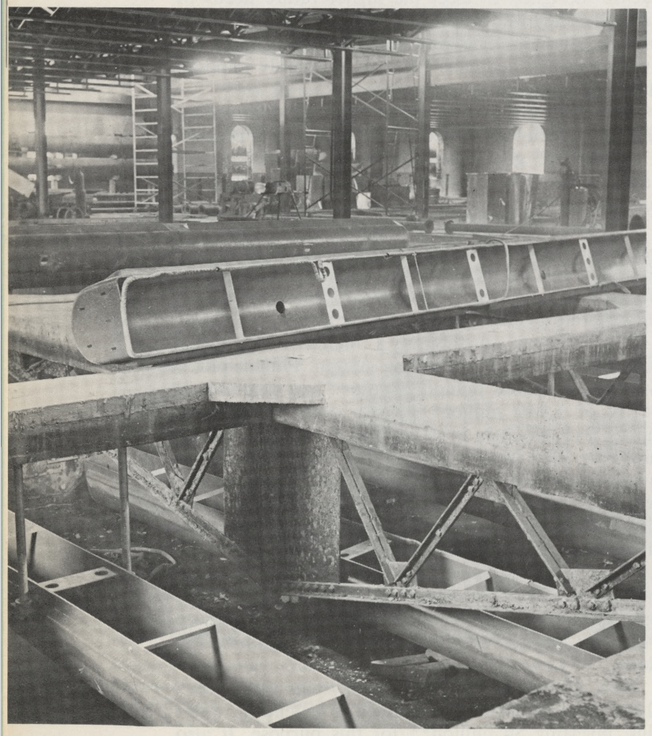
Belmont: West of the Schuylkill River, the third such plant was nearing completion. This was the new Belmont Plant, which will supply all the area west of the Schuylkill. Its attractive, light brick buildings and concrete basins had almost fully emerged.

By the end of the year, $8.8 million of construction (including $1.8 million in 1964) had been done on the new plant. With a projected final cost of $10.4 million, it was scheduled for a mid-summer, 1965, opening.

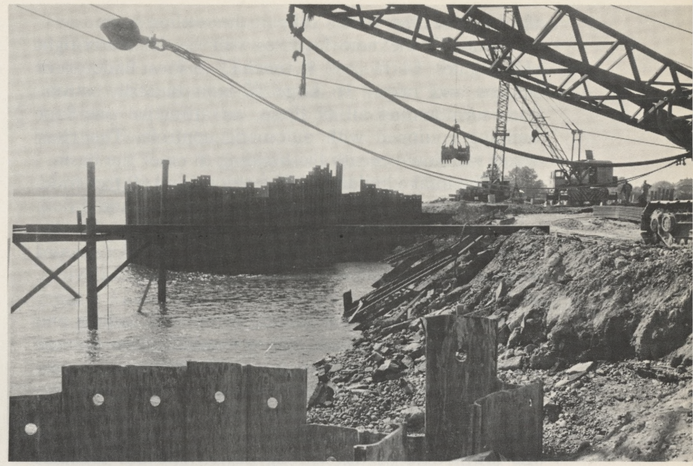
Completed were a five-story pre-treatment building, two settling basins (with related mixing basins), a wash water tank, a 1.8-million gallon clear well, and the south wing of the new filter building containing 14 rapid sand filter beds. These facilities went into service in the spring, thus relieving a facility shortage at Belmont caused by construction.

By December 31, the contractors had half finished two additional settling basins and the filter building's north wing, which will have 12 rapid sand filter beds. Renovation of an old administration building was also well advanced.

**Partial and final estimates.
#Limit of contract.



Belmont Plant: Construction of the north wing of the new filter building was well advanced by the end of 1964. Typical filter bottom (right) will go into 12 new rapid sand filter beds, each capable of processing three million gallons of water daily.



New Torresdale Intake: Work began on new push-button facilities for funneling Delaware River water to the Torresdale Water Treatment Plant. The $2.1 million job will include sluice gates, rakes, screens, valves, and chlorinators, all automatically controlled.

Replacing an obsolescent water works at the same site, built in 1903-04, the new plant will provide finer water, in reliable supply, for West Philadelphians. This will be Schuylkill River water purified and improved through more precisely controlled processes.

The new plant will have several advantages over the old:

1. With a rated capacity of 78 million gallons daily, it will be able to treat eight million gallons more each day. More important, it will have a peak rate capacity of 108 million gallons daily, thus enabling it to meet more easily the needs of consumers during emergencies and hours of high demand.

2. Housed in a one-story building, the new rapid-sand filter beds cover just one acre. They will replace 13 acres of old slow-sand beds dating from 1903-04 and a half-acre of old rapid-sand beds built in 1926. The greater compactness of the new plant will permit more efficiency and better control.

3. Water filtration in the new plant will be more efficient, because filtration rates will be set entirely by semi-automatic controls. Moreover, the 26 new filter beds, all of the rapid-sand type, can be kept in operation almost continuously, with only brief half-hour intervals for cleansing them of accumulated debris. Washing of the filter beds will be done with the press of a button by an operator. By contrast, the slow-sand beds in the old plant had to be taken out of service for 10 days to two weeks while they were washed by a crew of men with a special machine.

4. Semi-automatic controls will be used extensively throughout the new plant. They will be used to regulate the rate of water flow and the application of chemicals at various points in the treatment process. Controls will be more centralized than at the city's other two "push-button" plants. Filter beds, for example, will be regulated from a central panel only, without need for individual control consoles.

5. Because of greater efficiency, the new Belmont Plant will be operated with a smaller work force than the old water works.

The new plant will be supported by several previously modernized facilities. These include a raw water pumping station along the Schuylkill River and a high service pumping station at the plant itself.

Improvements were made during the year to two large pre-sedimentation basins which will be retained from the old plant. Besides a thorough cleaning, each basin got three new outlet pipelines, four feet in diameter. An additional outlet line of similar size was built for the underground filtered water basin to improve distribution to consumers.

Torresdale: The five-year old Torresdale Water Treatment Plant was the nucleus of an expanding complex of facilities. These facilities formed a huge service chain across much of the city.

By 1964, Torresdale water was reaching all that part of the city east of Broad Street, as well as recently linked-up portions of the Northwest. With a rated capacity of 282 million gallons daily (and peak load capacity of 423 M.G.D.), the new Torresdale Plant could have met the needs of its consumers twice over.

Work began in 1964 on a major addition to the new plant. This was the construction of new "push-button-type" intake facilities along the Delaware River.

The new intake, which will funnel river water into a huge riverside settling basin, will be built under contracts totaling $2.1 million. It is expected to supply water to the plant more efficiently and at lower cost than the old intake.

The new facilities will be built inside a large cofferdam, which at year's end was being constructed across

the east (or river bank) dike of the settling basin.

Among the new facilities will be 16 water-tight sluice gates (4 ft. x 7 ft. each), various underwater screens and rakes, 16 large 42-inch butterfly valves, and, surmounting all of these, an attractive one-floor building equipped with automatic controls. The river water will flow beneath the building to enter the basin.

The intake building, 120 feet long and 69 feet wide, will be constructed of reinforced concrete and brick, with aluminum framed windows, topped by glass blocks. Its automatic controls will sample the river water, record water pressures and levels, operate mechanical devices, and apply chlorine to the inflowing water.

Other features will include pumps for flushing and dewatering, a ventilation and dehumidification system, a monorail hoist, and an array of switchgear, transformers, and panelboards to operate the equipment.

The new intake will replace an old brick building and flap gates located at the head of a small inlet along the north dike of the settling basin. The old facilities will be demolished and the inlet will be filled up.

Scheduled for completion by 1966, the new intake will have several advantages over the old:

1. Its sluice gates will prevent chlorinated water in the settling basin from leaking back into the river—a problem that has long plagued the old intake.

2. Bar screens, rakes, and traveling screens will remove debris automatically from the incoming river water. This must be done manually at the old intake, resulting in extra labor costs.

3. Because the new intake will be located on the river (instead of inside a small inlet), there will be less ice formation in the winter. For the ice that does form, there will be "push-button" operated ice cutters.

4. With the intake on the river, water flow into the basin will be little affected by adverse wind and tidal conditions—an occasional problem in the past.

5. The new facilities will be entirely automatic, requiring minimum personnel and providing for efficient application of chemicals.

6. Matching the enlarged capacity of the new Torresdale Plant, the new intake will be able to pass the increased volumes of water that will be required in future years to meet the growing demand.

Minor improvements were made at the main plant under $137,000 of contracts. These included alterations to lime storage bins, installation of 221 new aluminum storm windows, zinc coating for the wash water piping, water proofing of dry wells, and sealing of joints in one of the conduits. The settling basins were cleaned.

Queen Lane: Except for the modernization of a pumping station (see page 13), there was no major construction at the Queen Lane Water Treatment Plant in 1964.

This new plant (1960) was the hub of an expanded water service area, an area that stretched from Chestnut Hill to South Philadelphia. Running generally between Broad Street and the Schuylkill River, the area includes the Roxborough-Manayunk district, taken over in 1962 when two small Roxborough water plants were closed.

The plant has a rated capacity of 120 million gallons daily and can meet peak demands at the rate of 150 M.G.D.

Minor work included the cleaning of settling basins and the repair of related operating mechanisms. Automatic equipment was installed to regulate the application of chlorine to water entering the pre-sedimentation basin.

Note: For water output and certain operating costs of the water treatment plants, see table on page 20.

IMPROVEMENT OF THE PUMPING STATIONS

The improved water from the treatment plants reached Philadelphia consumers in more reliable supply and at better pressures in 1964. One important reason for this was a chain of modern pumping stations.

Of the 15 stations in the water system, 13 had been newly rebuilt or substantially modernized.

As part of this modernization, old and often unreliable pumps gave way to new, more compact pumps, of larger capacity. Valves and piping were replaced, station interiors renovated, and automatic controls installed.

By increasing the efficiency of pumping, these changes helped to lower pumping costs:

Microwave Control: Savings on labor costs have resulted from the gradual automating of pumping stations. Since 1960, numerous pumps, valves, and other facilities in the distribution network have been brought under remote microwave control. Thus by the end of 1964, eleven pumping stations were being monitored and operated by remote control from a central headquarters. At the headquarters, a single operator could start or stop pumps, open or close valves, in distant stations with the "push of a button."

In 1964, two stations—Belmont and Queen Lane High Service—were linked to microwave, under a $55,000 contract.

As new stations have been brought under microwave control, it has no longer been necessary to have operating personnel in them. Four additional positions were eliminated in 1964.

A twelfth station—Torresdale Filtered Water—will be brought under microwave in 1965, and a thirteenth—Torresdale Raw Water—in 1966.

Lower Power Costs: Thanks to better pumps and reduced electric rates*, the electric power cost for pumping one million gallons of water to consumers in 1964 was only $11.41. This represented a drop from the $11.97 of 1963 and a sharp drop from the $13.79 (for steam and electricity combined) of a dozen years before. Power costs were lower in 1964 than in 1963 despite greater consumption of electricity by stations.

The three intake stations pumped nearly 346 million gallons of river water daily to the treatment plants. Of the 336 million gallons of purified water leaving the plants each day, about 62% was pumped and repumped to consumers. The rest flowed to consumers by gravity.

*Electric rates were reduced for large users in Philadelphia in 1963. The Water Department felt the full effect in 1964.

Sizable improvements were made in some pumping stations. To the $10.2 million invested in previous years, the Water Department added $1.2 million of new construction. This included the following:

Queen Lane: Practically completed was the $462,000 modernization of a "high service" pumping station at the Queen Lane Water Plant. With the finishing of this four-year old job, many consumers could look forward to steadily improving service.

Attached as center wing to the Queen Lane filter building, the station pumps about 28% of Queen Lane output to consumers in Northwest and North Philadelphia.

With the installation of six new electric pumps, pumping capacity rose from 65 million gallons daily to 77.5 million. New suction wells were built to increase pumping efficiency, and there were extensive interior changes in piping, lighting, and other equipment. Only some minor odds and ends remained to be completed.

Torresdale: Improvements at two pumping stations that serve the Torresdale Water Treatment Plant were well advanced.

At the "raw water" station, which pumps Delaware River water to the plant, a $953,000 modernization was under way. About $567,000 of work was done during the year, and the new station was expected to be ready by early 1966.

New plumbing was completed, a new ceiling was installed, and the windows were bricked up. Six new pumps were on hand, ready for installation. The new pumps, which will replace six old ones, will raise the station's capacity from 300 million gallons daily to 360 M.G.D.

At the "filtered water" station, which pumps purified water from the plant to Far Northeast consumers, three small "high service" pumps were being installed. These pumps, when ready in 1965, will increase the station's high service capacity from 21 million gallons daily to 42 million. The cost of the job is $159,000. The filtered water station also has a large "low service" pumping capacity that meets the needs of consumers in other parts of the city.

Fox Chase: To improve service to Northeast neighborhoods, pumping capacity at the Fox Chase Booster Pumping Station was expanded. Three new pumps, which replaced three old ones, raised total station capacity from 12 million gallons daily to 25.3 M.G.D.

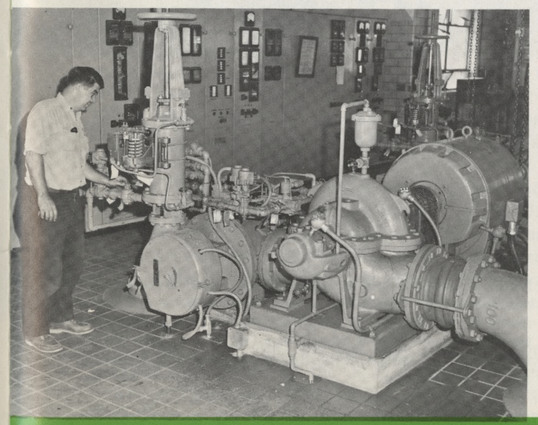
The new pumps were part of new improvements costing $144,000.

Other Stations: Some attractiveness was given to the Lardner's Point Pumping Station, which has been an eyesore for many years. Landscaping, paving, fencing, and new window guards were among minor improvements. Replacement of valves in three large chambers connecting with the city's distribution system was 80% finished. The various work at the station, which was extensively modernized in earlier years, was being done under $296,000 of contracts.

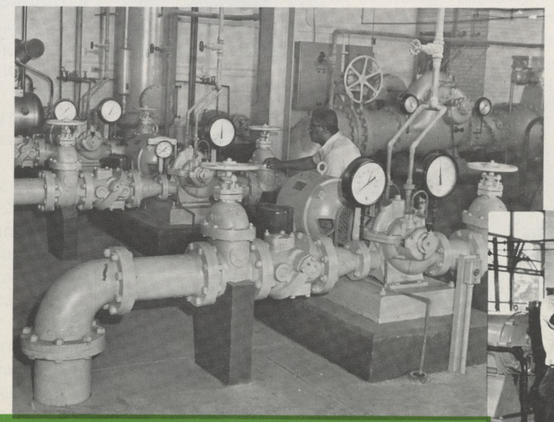
Some minor improvements ($122,000) were also made at the Belmont Raw Water Station and at the Roxborough High Service Station ($43,000). The latter work was electrical, while at the Belmont Station the contractor installed new pumping, tile partitions, an aluminum insulated ceiling, fluorescent lighting, and electric heating.

Fire fighting demands on the two high pressure stations—Race Street and Fairhill—dropped markedly during the year. The two stations pumped only 26 million gallons of water for multiple alarm fires, compared with 66.7 million gallons the year before. Two 20-hour runs at the Race Street Station were the longest. The stations also pumped over 55 million gallons for standby and test purposes.

Fox Chase: Three new electric pumps at the Fox Chase Booster Station increased station capacity from 12 million gallons daily to 25.3 M.G.D.



Queen Lane: Completed was a $462,000 modernization at the Queen Lane High Service Station. With six new pumps, the station acquired a pumping capacity of 77.5 million gallons daily.



Lardner's Point: Landscaping and new valves were final touches in extensive improvements made in the past decade at Philadelphia's biggest filtered water pumping station. Valves went into huge chambers serving distribution pipelines.

Water Storage: Conversion of old slow sand filters at the Torresdale Water Plant into underground reservoirs for filtered water continued. The $4.2 million job will provide additional storage for 143 million gallons.

National Award: The design for the new underground reservoirs at the Torresdale Plant won a national award from the U. S. Community Facilities Administration. Mayor James H. J. Tate (right) accepts award for the City. Design consultants were Morris Knowles, Inc., of Pittsburgh.

WATER MAINS CLEANED AND CEMENT LINED
1947 to 1964 — 218 MILES

GROWTH OF WATER STORAGE

To provide a protected water supply, the department plans to create additional underground reservoirs for filtered water at all its treatment plants. These reservoirs will be formed from abandoned filter beds of the slow sand type.

1. Construction of such reservoirs moved forward rapidly at the Torresdale Plant in 1964. Forty-nine acres of old filter beds were being transformed into four large, interconnected basins. Of the 65 beds, 21 were fully converted and the other 44 were being worked on. By the end of the year, $3.1 million of construction had been completed under contracts valued at $4.2 million.

Financed in part with Accelerated Public Works funds from the Federal Government, the new Torresdale reservoirs are scheduled to go into service in the summer of 1965.

The basins, which will be supplied by some of the largest concrete pipe ever laid in the Eastern U.S., will hold 143 million gallons of water. Water levels and flow in them will be controlled by push button from the Torresdale Plant. Panels at the plant will activate key valves and will receive second by second data from basin measuring devices.

Because of its unusual features, the Torresdale project was cited by the U.S. Community Facilities Administration in 1964 as one of 20 "outstanding" Accelerated Public Works jobs in the nation. CFA awards were made to the Water Department and to the design engineers, Morris Knowles, Inc., of Pittsburgh.

2. Conversion of eight filter beds at the small Upper Roxborough Plant, which was closed in 1962, is scheduled to begin in mid-1965. The beds, when converted, will hold 17.6 million gallons of filtered water supplied by the Queen Lane Plant.

Old slow sand beds at the Queen Lane Plant itself, and at the Belmont Plant, will be turned into reservoirs in subsequent years.

By 1966-67, the Water Department will have added 234 million gallons of storage capacity at all its plants. As a result, it will have an efficient "first reserve" of 505 million gallons of filtered water. In addition, it will still have a "second reserve" of older, less efficient reservoirs, capable of holding 625 million gallons of filtered* water. This capacity will be independent of the large sedimentation basins used for treatment of raw water at the plants.

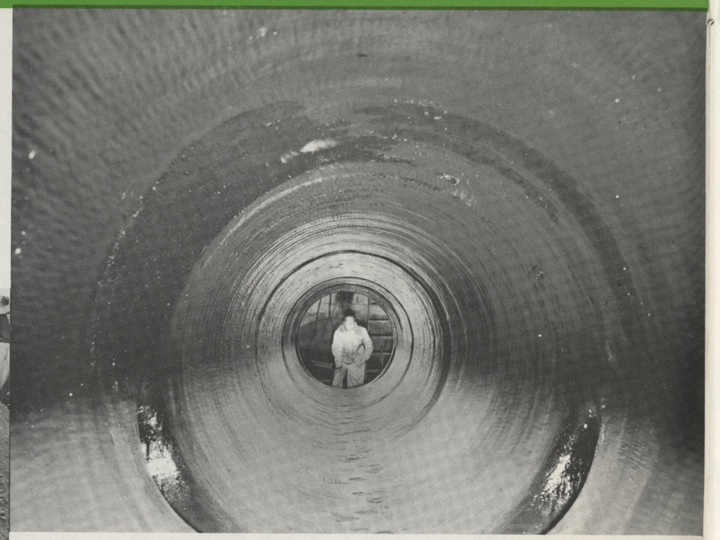
New piping and new valves were installed during the year at the closed Lower Roxborough Plant. These will service a small underground basin, which has been retained. The work included cleaning and cement lining of connecting mains at both the former Roxborough Plants. This was done under a $225,000 contract.

Some minor physical improvements were made at the two open reservoirs—East Park and Oak Lane. Portions of these reservoirs may be covered in future years to protect water quality.

*All but one of the basins at the East Park Reservoir.

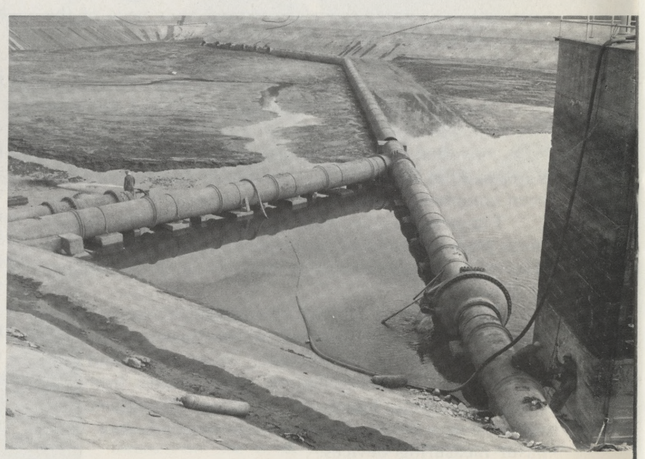
WATER MAINS GREW BY 41 MILES IN 1964 TO MEET CONSUMER NEEDS

Cleaning: To improve pressures and reduce water discoloration, the Water Department cleaned and cement lined 29 miles of old mains—more than double the mileage of the previous year.



New Main: Independently of the many miles of water mains constructed by contractors, the Water Department's own distribution forces laid 6,600 feet of mains. One of these was in Haldeman Avenue.

Supply Lines: Largely finished were four steel mains that will carry 100 million gallons of water daily from the Queen Lane Plant to consumers. The 4-ft. diameter mains replace old cast iron mains in McMichael Street.



Belmont Reservoir: New outlet pipelines, four feet in diameter, were installed in the raw water reservoir which receives Schuylkill River water for the Belmont Water Treatment Plant.

NEW MAINS FOR BETTER DISTRIBUTION

To assure a steady flow of water to consumers, the Water Department has given increasing attention to its distribution network. At the end of 1964, this huge system included 3,158 miles of water mains, 71,000 pipeline valves, and 25,000 fire hydrants.

Water Main Expansion: The replacement and extension of water mains will form one of the department's principal programs in future years. This is because many of the city's water mains are very old, and the need for more and better pipelines is growing.

To meet this need, the department has built 515 miles of new mains since January 1, 1952. The net growth of the water main system was 437 miles.

Some of the new mains were built to replace older mains. Others were intended to add flexibility, capacity, quality and breadth to water distribution. Reinforcing water pressures and improving service in many neighborhoods, they have also made possible the growth of new industrial areas.

Nearly 41 miles of new mains, valued at more than $4 million, were laid in 1964. Especially important was the extension of water service to homes and industries in new neighborhoods. Fourteen miles of mains were constructed for such "new services," particularly in the fast developing Northeast and Eastwick.

Several miles of pipelines were built to reinforce water pressures in various parts of the city. Among these was a 20-inch main in Byberry Road from Bustleton Avenue to Roosevelt Boulevard ($300,000).

Still possessing hundreds of miles of mains that were built before 1900, the Water Department replaced an additional five miles in 1964. The biggest replacement project was just south of the Queen Lane Water Treatment Plant. There the department resumed the relaying of four parallel supply mains that carry 100 million gallons of Queen Lane water daily to consumers. Portions of these cast iron mains had been replaced with steel piping in 1959. This work was now resumed on 3,800 feet of 4-ft. diameter piping in McMichael Street between Roberts and Abbottsford Avenues. The new steel pipelines (under a new $540,000 contract) will be finished early in 1965.

To improve water pressures and reduce water discoloration, the Water Department has been stepping up the cleaning and cement lining of many old mains. This work, far less expensive than replacement, has extended the life of many mains far into the future.

In 1964, the department cleaned and lined 29 miles of mains, ranging from six inches to six feet in diameter. The mileage cleaned was more than double that of 1963. Almost $1.5 million of work was done under $2.1 million of contracts.

Because of milder weather, water main breaks were down to 736 in 1964, compared with 919 the year before. Most of these breaks were in small six-inch diameter pipes, many of which were quite old. Except for the rupturing of two 20-inch lines, all the broken mains were 16 inches or less in diameter. For the first time in years, the city's larger mains were unaffected.

Valve Replacement: Aging valves have posed an increasing threat to the flexibility of Philadelphia's water supply. For this reason, the Water Department is replacing more and more old valves in its existing pipelines. In 1964, it replaced 1,108 pipeline valves, a marked increase over previous years. Most of these were under 16 inches in size.

Valve inspections, which jumped by 70% in 1963, remained at a high level. Nearly 33,000 were made.

High Pressure System: Little modernization was done on the independent "high pressure" system, which provides fire protection for the central and north central parts of the city. One high pressure main was replaced, however, for a distance of 1,265 feet in 12th Street between Market and Walnut Streets ($125,000). There are plans to replace a number of high pressure pipelines and valves in the future. This work will supplement the modernization already effected in the high pressure pumping stations.

A HALF-MILLION EFFICIENT METERS

Philadelphia's water metering program reached an important goal.

The first 10-year overhaul and replacement of every small water meter (⅝-inch and ¾-inch) in the city was completed. This rotation plan, started in 1955, had brought 500,000 small meters to peak efficiency. Only 5,000 "hard core" meters had temporarily escaped.

The city's 16,650 large meters, which range from one inch to 12 inches in size, had already been fully rotated.

Though these important programs had been completed, there was no let up in meter maintenance. Dependent upon its meters for revenues, the Water Department took these further steps to keep its meters functioning—

1. Plans were laid for a second 10-year rotation of small meters, and for a three-to-four year rotation of large meters, starting in 1965.

2. The Meter Repair Shop continued to give priority to the repair of non-registering, or otherwise malfunctioning, meters. More than 9,500 such meters were repaired in 1964. Thanks to such priority, as well as to the rotation plans, malfunctioning meters reported each year have declined by more than half since 1958.

3. There was continuing emphasis on the repair of large meters. These meters represent only 3% of all meters. They account, however, for 56% of water revenues attributable to *measured* water consumption and 38% of all revenues.

4. The Meter Shop performed more than 93,000 jobs. These included the repair of 57,000 meters in the shop and nearly 11,000 in the field. More than 62,000 meters (including 4,400 large ones) were reset and returned to service. At least 120,000 field calls were made on customers.

5. Meter Shop personnel declined to 71 during the year—down by more than half in 10 years. Reorganiza-

tional shifts have gradually whittled the number of employees, and seven additional positions were eliminated in 1964. This was done by converting two-man meter repair trucks to one-man trucks. Surplus employees were reassigned to other departmental vacancies.

6. Meter personnel examined meters in municipally owned properties during the year to determine the fitness of meter sizes. In some cases, meters were replaced with smaller sizes, resulting in dollar savings for municipal departments. This program will be continued in 1965.

WATER SYSTEM MAINTENANCE

Other maintenance activities included the following:

Distribution: Sixty street crews kept the water main network, and its related valves, ferrules, fire hydrants, and other facilities in top operating condition.

The crews regulated water pressures and flow, flushed out mains, repaired and inspected distribution facilities, made new service connections, conducted fire flow tests, pumped out flooded cellars, and performed many other jobs.

Some of these jobs are summarized below:

	1963	1964
Broken Mains Repaired	919	736
Joints Recaulked or Repaired	202	213
Valves Repaired	3,186	2,783
New Valves Installed in Mains	1,190	1,261
Valves Inspected	38,878	32,966
Fire Hydrants Repaired	13,900	11,816
Fire Hydrants Installed	382	341
Fire Hydrant Inspections	73,867	70,400
Fire Hydrants Painted	21,148	13,469
Ferrules Installed	5,257	4,712
Ferrules Shut off or Drawn	1,259	2,324

Among significant maintenance developments in 1964—

1. The Water Department experimented with a new type of harness for fire hydrants. The harness, borrowed from New York City and improved by the Philadelphia Water Department, was designed to prevent the illegal opening of fire hydrants. So successful did the harness prove, that the department planned to install it on several hundred fire hydrants in 1965.

Because illegal openings of fire hydrants occur summer after summer in Philadelphia, often seriously reducing water pressures in some neighborhoods, the new harness will be of great benefit. It will help to maintain pressures and provide added fire protection.

2. "Coupons," or sections, of many old water mains were removed for inspection of tuberculation. In this way, the condition of old mains was checked for possible cleaning and lining.

Building Maintenance: Though contractors did some building maintenance, much of the work was performed by Water Department personnel. Such personnel completed 988 jobs of various kinds.

These included transformation of the pipe yard building at the Lardner's Point Pumping Station into a modern office-storage building; installation of generators and fuel tanks at various points in the water system; repair of concrete beams at the Queen Lane Plant; and movement of the Materials Testing Laboratory.

Much time was spent in repairing damages caused by vandals.

Logan Garage: The big Logan Garage kept 322 passenger cars and trucks, plus 800 pieces of "off the road" equipment, at top efficiency. Close to 20,000 repairs, inspections, and other routine services were performed on these vehicles. In addition, there were many special jobs.

During the year, the department purchased 31 trucks as replacements. With a gross vehicle weight of 4,800 lbs., the new trucks were lighter and more suitable for departmental operations than were the 7,500-pound trucks which they replaced. Purchase savings of $31,000 were realized on them, and it was expected that operating costs would be lowered.

Maintenance by the Machine Repair Shop, meter and gauge forces, and other personnel was extensive.

Fire Hydrant Protection: To prevent hundreds of illegal summer-time openings of fire hydrants, the Water Department successfully developed a new type of steel locking device. It was planned to put such devices on 1,500 of the most abused hydrants in 1965.

Logan Garage: Thirty-one light weight trucks replaced heavier trucks in the automotive fleet. Purchased at lower cost, the new trucks were also expected to make possible operating savings.

SCHEDULED WATER SYSTEM CAPACITIES — JANUARY 1, 1966

*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
	Filtered water basin	16.8
	Filtered water clear well	1.8
	Future filtered water basins (ready in 1967)	21.4
QUEEN LANE PLANT:	Pre-sedimentation basin	177
	Four 3-MG upper settling basins	12
	Four 3-MG lower settling basins	12
	Two 20-MG filtered water basins	40
	Future filtered water basins (ready in 1968)	50
TORRESDALE PLANT:	Pre-sedimentation basin	176
	Four 10-MG sedimentation basins	40
	Filtered water basins	193

** OTHER RETENTION CAPACITIES
(in millions of gallons)

		TOTAL
UPPER ROXBOROUGH:	Filtered water basin	8
	Future filtered water basins (ready late in 1966)	17.6
LOWER ROXBOROUGH:	Filtered water basin	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)	360
FILTERED WATER:	1. Treated Schuylkill Water	
	Belmont High Service Station	39.5
	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	210
	Oak Lane High Service Station	50
	Torresdale High and Low Service Station (200 MGD high, 42 MGD low)	242
	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)

* Shut down permanently in 1962: Upper Roxborough Plant, 22 MGD rated, and Lower Roxborough Plant, 10 MGD rated.

** Shut down permanently in 1962: 147 MG pre-sedimentation basin at Upper Roxborough.

† Shut down permanently in 1962: Shawmont Raw Water Station, 50 MGD, and Roxborough Booster Station (raw water), 73 MGD.

WATER TREATMENT PLANTS: OPERATING DATA

1. FILTERED WATER OUTPUT
(in millions of gallons daily)

	1960	1961	1962	1963	1964
TORRESDALE	165.0	157.4	176.7	172.3	167.2
QUEEN LANE	93.5	94.4	94.9	106.2	108.6
BELMONT	56.5	58.1	54.9	53.6	60.8
ROXBOROUGH (both plants)	20.8	22.3	21.2	(closed)	
TOTAL	**355.8**	**332.2**	**347.7**	**332.1**	**336.6**

NOTE: Plant output has declined somewhat during the past 10 years because (1) less water is now lost from the distribution system, and (2) consumers use less water. As consumption rises in future years, output will increase. Output in 1964 was about 70% of rated treatment capacity.

2. CHEMICAL COSTS FOR TREATMENT
(per million gallons)

	1960	1961	1962	1963	1964
TORRESDALE	$13.91	$10.38	$10.53	$ 9.50	$ 8.53
QUEEN LANE	8.35	8.90	9.26	11.82	10.66
BELMONT	5.40	5.28	6.20	7.24	8.52

NOTE: Water quality problems vary from plant to plant. Thus costs cannot be the same. At Torresdale, experimental chemicals and improved methods have combined to reduce chemical costs.

3. AMOUNT OF CHEMICALS USED IN TREATMENT
(in millions of pounds)

	1960	1961	1962	1963	1964
ALUM	21.97	19.73	25.44	23.41	19.25
CHLORINE	7.44	8.82	9.82	11.49	12.04
LIME	9.11	8.66	9.99	9.79	9.33
SODIUM HEXAMETAPHOSPHATE	.81	.76	.67	.73	.78
FLUORIDE	.85	.89	.83	.84	.71
CARBON	.35	.40	.98	1.23	1.57
SODIUM CHLORITE	.45	.12	.09	.09	.06
COPPER SULPHATE	.10	.10	.03	.03	—
SULPHUR DIOXIDE	—	.01	.03	.04	.06
EXPERIMENTAL CHEMICALS	.37	.17	.14	.35	.79
TOTAL	**41.45**	**39.66**	**48.02**	**48.00**	**44.59**

NOTE: Total cost of chemicals used in 1964 was $1,177,844, compared with $1,257,109 in 1963.

4. ELECTRIC POWER CONSUMPTION FOR TREATMENT
(in millions of kilowatt hours)

	1960	1961	1962	1963	1964
TORRESDALE	5.45	6.62	5.10	4.80	5.60
QUEEN LANE	1.49	1.67	2.77	1.96	2.06
BELMONT	.87	.98	.86	.78	2.29
ROXBOROUGH (both plants)	.11	.11	.55	(closed)	
TOTAL	**7.92**	**9.38**	**9.28**	**7.54**	**9.95**

NOTE: The marked rise in electric power consumption in 1964 took place chiefly at Belmont, where several facilities of the new semi-automatic plant went into service. The new plants have extensive electronic equipment.

WATER QUALITY AND RESEARCH

GOOD WATER— A GOAL ACHIEVED

Philadelphians were enjoying more than mere water abundance in 1964. They were also receiving pure and palatable water.

The city's water continued to be one of the purest treated waters in the nation. Its coliform organism count was only 3% of what is permitted under the drinking water standards of the U.S. Public Health Service for interstate carriers.

Consumer complaints about tastes and odors were far fewer than in past years. Many of them related to chlorine odors caused by deadends in the distribution system or (on several occasions) by imprecise dosages at the plants. For the most part, chlorinous tastes and odors were rapidly dissipated as the water entered the city's pipelines. Phenolic and other "industrial chemical" tastes and odors did not occur.

The predominant odor of the river water entering the plants was "musty," but this was largely removed through treatment.

Because of extensive stream clean-up in the past (see page 25), the plants were able to treat the river water more efficiently. Fewer taste-and-odor causing substances, as well as lighter organic loads, were brought into the plants by the raw water.

With "push-button" controls and modern equipment, the new plants were able to exercise better control over chemical application, coagulation, mixing, settlement, filtration and other steps in the treatment of the river water. In 1964, improved laboratory methods—particularly use of "zeta potential" measurements—gave closer control over chemical dosages.

So effective was this control at the Torresdale Plant, for example, that tastes and odors were eliminated for many months without the use of carbon. The raw water, which in the language of the chemists had a "taste and odor threshold" of 32 at times, had a threshold of only four when treated. Only during the summer did the plant have to use some carbon.

Carbon was also used for the second year at the Queen Lane Plant to keep tastes and odors under control.

All the plants continued to depend heavily upon chlorine for the destruction of bacteria and organic matter. They also consumed sizable quantities of coagulant chemicals, such as alum. The Torresdale Plant experimented successfully with a special clay to improve coagulation and settlement of impurities in the water.

There were some consumer complaints about water hardness, resulting from lower flows in the rivers.

Despite water hardness and isolated tastes and odors in the city's pipelines, the principal water quality problem in 1964 was water discoloration. Though cleaning and lining of large mains have eliminated such discoloration in most sections of Philadelphia, there were still 38 small neighborhoods with recurrent water discoloration. These are neighborhoods supplied by intricate grids of small and old pipelines. During the year, the Water Department began to clean and line these mains, and it will continue this program for several years to come.

In 1964, it also continued to remove deadends, flush out some mains regularly, and replace others.

Exposed to the open air and sunlight, the East Park and Oak Lane Reservoirs posed some water quality problems. Crustacea and algae flourished in the huge East Park basins, and some of these growths floated into West and South Philadelphia. As a result, the department restricted the use of East Park water and diluted it as much as possible with water directly from the Queen Lane Plant. Algae in the smaller Oak Lane Reservoir were controlled effectively with chemicals.

Departmental chemists and sanitary engineers kept a close watch on water quality. They made more than a million and a half tests, taking samples from many points in the water system as well as from the rivers. More than 18,000* samples were taken from pipelines and reservoirs for coliform testing alone.

*Includes filter plant effluent.

Laboratory Control: One reason for the fine quality of Philadelphia water was constant testing. In 1964, chemists and engineers made one and one-half million tests on water samples taken from many points in the water system.

CONDITION OF THE RIVERS

For the fourth successive year, drought put the Delaware and Schuylkill Rivers to the test. Greatly improved in the past years, the two streams weathered the drought without serious lowering of water quality.

The year was the driest since 1922. Rainfall, as measured at Philadelphia International Airport, was only 29.84 inches. This was 2.43 inches below the previous year and 13.48 inches below 1962.

The drought, which extended from late spring to early autumn, reduced water flow in both rivers. The mean flow in the Delaware at Trenton was 8,175 cubic feet per second, compared with a 30-year average of 12,200 C.F.S. In October, the flow sank as low as 1,180 C.F.S.

The October flow at the Fairmount Dam on the Schuylkill was less than half the 1931-60 average for that month, and the mean flow for the year—2,261 cubic feet per second—was proportionately low.

Fortunately, heavy rains in December returned the flow in both rivers to normal.

The rains also corrected other river conditions prevalent through much of the year. The most notable condition was that of hardness*, which ranged from 6.7 to 16.6 grains per gallon (monthly average) in the Schuylkill, with an annual average of 10 grains. Hardness of the normally soft Delaware water was also higher. This had a monthly average of 4.3 to 6.7 grains, and an annual average of 5.7 grains.

*Measured as calcium carbonate.

Turbidities were very low in both streams. They fell steadily from January through November in the Delaware, sinking from 66 parts per million to 19 P.P.M. The averages in the Schuylkill were 24 P.P.M. at the Queen Lane intake and 18 P.P.M. near the Belmont intake.

Despite lowered flows and increased hardness, the quality of the Delaware River water was slightly better than it had been the year before. Lower turbidities, resulting not only from lower flow but also from the end of extensive dredging by the U.S. Army Engineers, allowed sunlight to penetrate further into the river, fostering rich growths of algae. The latter, by releasing oxygen into the stream, helped to stabilize the quality of the water. In the Schuylkill, algae also flourished but they caused coagulation and filtration difficulties for the Belmont Plant.

Though tastes and odors associated with industrial wastes occurred very infrequently, the spilling of such wastes into the streams remained a challenge. Several oil spills from industrial plants outside the city resulted in the killing of many fish in the Schuylkill. In June, 100,000 herring died in the Delaware near Lardner's Point, because of the lack of dissolved oxygen in that sector of the river.

Radioactivity in the rivers was negligible, and much of this was removed through treatment in the water plants.

STUDIES OF THE DELAWARE ESTUARY

So important are the rivers to the city's water supply that the Water Department has been studying them with increasing attention.

In 1964, it continued to accumulate extensive data about Delaware River conditions from (1) a network of automatic monitoring stations established in past years, and from (2) weekly collection of midstream samples.

The half-dozen monitoring stations, crammed with electronic measuring devices, were operated jointly with the U.S. Geological Survey, which has been cooperating with the city in stream studies since 1949.

Midstream sampling was at an all time high, as the department's fast cabin cruiser (acquired in 1963) roamed the river from Marcus Hook to Trenton, occasionally stretching the weekly runs into 24-hour surveys. Equipped with an on-board laboratory and portable measuring devices, the cruiser made possible an extensive view of changing river conditions.

Much of the midstream sampling was in aid of a two-year quality study conducted by the U.S. Public Health Service. Personnel of that service surveyed the river southward from Marcus Hook to Reedy Island. Data from the joint Philadelphia-USPHS studies was being made available to 10 public agencies interested in the estuary.

To broaden its knowledge of the estuary, the Water Department continued study of (1) the effects of photosynthesis in restoring dissolved oxygen to the river, (2) the ultimate oxygen demands of organic and chemical substances in the stream, (3) sludges from the river bottom, and (4) the effects of pesticides on river life. A portable pyroheliograph, to measure the intensity of sunlight, was acquired as part of the photosynthesis study.

For Cleaner Streams: Members of the Pennsylvania Sanitary Water Board pause for a look at the improved Schuylkill River and other Philadelphia clean-up efforts. Dr. Charles L. Wilbar, State Secretary of Health, second from left, and Dr. Maurice K. Goddard, Secretary of Forests and Waters, right.

The department also performed many chemical analyses for the Delaware River Basin Commission, which tagged hundreds of fish in order to follow their movements and distribution. The analyses were to determine how varying water quality may affect fish.

Many samples were taken during the year from the Schuylkill River, but on a routine, rather than intensive, basis.

STUDIES OF CREEK FLOW AND WATER USE

Along with increasing river study, the Water Department expanded its research in other directions.

Creek Flow—To provide for future flood control, as well as to learn more about stream pollution, the Water Department and the U.S. Geological Survey began a joint study of seven creeks which flow into the Delaware and Schuylkill Rivers. These creeks carry some sewage to the rivers during heavy storms.

Ten stream gauges were installed along the Poquessing, Pennypack, Byberry, and Frankford Creeks, and it was planned to install an additional 10 gauges along the Tacony, Cobbs, and Wissahickon Creeks in 1965.

The stream gauges will measure the surface height of water in the creeks, recording the measurements on a punched tape. The measurements, when related to "discharge curves" for the stream areas, will provide data on volume of water, together with peak and minimum flow rates.

Supporting the stream gauges will be a network of rain gauges, installed in various parts of Philadelphia. By the end of 1964, twenty-one rain gauges were in service, and others were planned.

Residential Water Use—To make possible more efficient and economical design of future water facilities, the department joined in a national study of residential water use. The study was being conducted in 14 cities by the U.S. Federal Housing Administration and Johns Hopkins University to determine water use habits.

For this purpose, the department began its own study in two neighborhoods of Northeast Philadelphia. Water was piped into each neighborhood through a single supply main, with a master metering device (and tape recorder) recording flow each minute of the day. To supplement this data, departmental interviewers visited each home.

The study, to last a year, will be followed by studies of other selected Philadelphia neighborhoods.

Sewer Inlet Study: To improve the future design efficiency of sewer inlets, the Research and Development Unit made various field studies. Inlet slope, grate size, other factors, were noted.

Photosynthesis Study: To learn more about the effect of sunlight on the growth of algae, which restore streams by releasing oxygen, the department acquired a portable pyroheliograph to measure sunlight intensity.

Creek Study: Water personnel built dams across several small creeks and set up gauges to obtain data on volumes and rates of flow in them. The study will aid future flood control and pollution abatement.

Creek Study: The gauge records the surface height of creek water on a punched tape. Stream gauges, such as this, are supported by a network of rain gauges, which provide added data from all parts of the city.

THE SEWAGE SYSTEM

TOWARD CLEANER STREAMS

Through Philadelphia's sewers in 1964 flowed a bewildering outpouring of wastes from industries, businesses, and homes. Fortunately for the cleanliness of the Delaware and Schuylkill Rivers, barely any of this flow went into them untreated.

By 1964 Philadelphia was treating nearly all its sewage flow. In 18 years the city had invested $89 million in new sewage disposal facilities, plus $150 million in a huge tributary sewer system. Forming a vital element in Philadelphia's water supply plan, the new facilities were helping to clean up the streams from which the city draws its water.

The success of the stream improvement was evident:

1. Philadelphia's modern sewage plants were treating 364.2 million gallons of domestic and industrial wastes daily—the second highest flow in their history. This flow included 99% of all the city's sewage, plus nearly 37 million gallons each day from neighboring communities. By 1965, the plants will pick up the remaining untreated 1% of local sewage.

Though 99.9% of the local sewage flow was water#, the plants removed 224 tons of sewage solids each day, or 82,000 tons during the entire year. At the same time, the biochemical oxygen demand of the sewage (an important measure of pollution) was reduced by the yearly equivalent of 47,000 tons. Thus the Delaware and Schuylkill Rivers received fewer solids, and they retained more of their dissolved oxygen. Both water quality and aquatic life benefited.

This extensive treatment contrasted sharply with the pollution of local streams by Philadelphia in 1950. In that year, most of the city's raw sewage went directly into the rivers. Treatment began to increase with the opening of three new plants between 1951 and 1955, and since then more and more sewage has reached these plants.

2. Waste treatment plants constructed by hundreds of communities and industrial firms were helping to lighten the load of untreated domestic and industrial wastes reaching Delaware Valley streams. This was the result of 25 years of efforts by Federal, interstate, and local public agencies, together with allied citizens' groups.

The growing improvement of local streams has had many important side effects. Shipping in the Port of Philadelphia has been encouraged by the cleaner waters; boating and fishing have been stimulated.

Philadelphia's expansion of its sewage facilities was accelerated in 1964. More than $6 million* was invested in treatment plants and intercepting sewers, compared with $4 million the year before. At the same time, almost $16.7 million* went into new sanitary and storm sewers, an increase of $7.5 million over 1963. The latter figures included a small amount for water mains.

Of the 263 contracts worked on during the year, 209 were brought to completion. The latter were valued at $16.3 million*, of which $14.3 million was for sanitary and storm sewers.

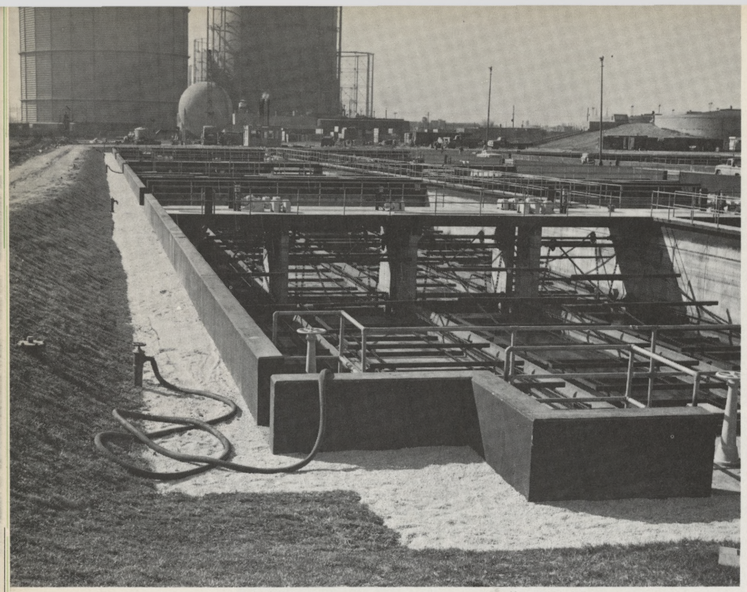
During the year, 128 new contracts with a limit of $12.4 million** were awarded. On December 31, the value of sewage contracts in force was $21.7 million.**

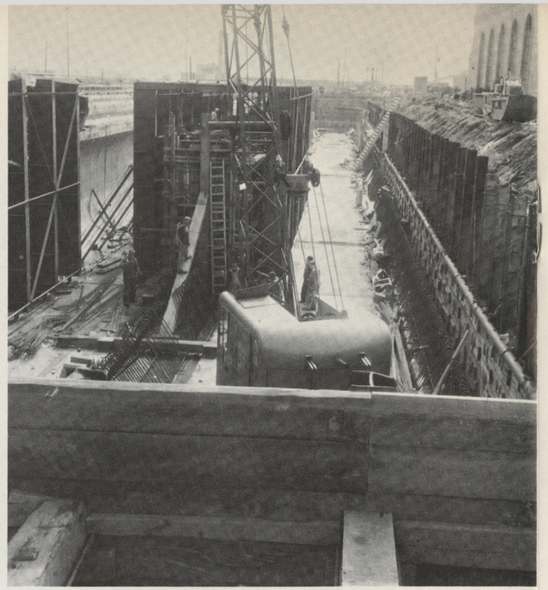
EXPANSION OF THE SEWAGE TREATMENT PLANTS

Though the sewage treatment plants have been in operation for only a decade, the increase in sewage flow is requiring further expansion and improvement. Original facilities wear out or become inadequate, better equip-

#Some national engineering magazines and municipal departments have substituted the term "wastewater" for the word sewage. The word "wastewater" is not yet generally understood by the public, but may displace "sewage" in time. In the same manner, the term "pollution control" is being used instead of sewage treatment.

*Partial and final estimates.
**Limit of contract.





Northeast Sewage Works: Four new final settling tanks (left) and a new aeration tank (right) went into service, increasing the treatment capacity of the Northeast Works from 125 million gallons daily to 175 M.G.D. The increased capacity will meet public needs for 20 years.

ment comes on the market, and operating experience dictates changes.

In 1964, more than $2.5 million of improvements were made at the three plants.

Northeast Works: To assure future protection of the Delaware River, the Water Department continued its $5.3 million expansion of the Northeast Treatment Works. By the close of the year the job was nearly done, and much of the new plant was in operation.

Four new final settling tanks and a new aeration tank went into service, raising the rated treatment capacity at Northeast from 125 million gallons daily to 175 M.G.D.

The new tanks met a pressing need. Sewage flow, which was 141 million gallons daily in 1964, had greatly exceeded the rated capacity of the plant for a number of years. The new capacity, it was predicted, would meet the needs of Northeast and North Philadelphia (including those of several outlying communities) until 1985.

At the close of 1964, some details of the expansion were still to be completed. These included the blower building's new wing (largely done), piping in areas outside the tanks, and new sludge pumps. These details were to be cleaned up by May 1965. A storage building was finished in December.

Minor work (under $117,000 of other contracts) included installation of 17 sluice gate "operators" in the grit channels and pumping station; resurfacing of concrete walkways around the grit channels; repairs to a sludge digestion tank and other facilities; and much electrical installation.

Because of extensive construction, the removal of suspended solids by the Northeast Works was only 71% in 1964, compared with 76% in 1963 and 82% in 1962. The reduction of biochemical oxygen demand, at 68%, was also lower. With the new tanks in service, it is expected that the removals will climb markedly in 1965. The Northeast Works provides both primary and secondary treatment.

With its sludge lagoons full, the plant sent 43 million gallons of digested sludge by barge to the Atlantic Ocean. Some of this sludge was taken from the lagoons. The cost of the seaward transport was $296,000.

Southwest Works: With new intercepting sewers going into service along the Schuylkill River, sewage flow to the Southwest Treatment Works has climbed steadily. The flow rose again in 1964, averaging 123 million gallons daily. This was five million gallons a day more than in 1963 and 16 M.G.D. above 1962. The plant, however, was still below its design capacity of 136 million gallons daily.

Providing only primary treatment, the plant removed 54% of suspended solids and 31% of biochemical oxygen demand. This was somewhat better than in the two preceding years.

Completed was a new lagoon for the disposal of digested sludge. It was planned to build still another lagoon in 1965, because existing lagoons are full and sewage flow will probably continue to rise. Future barging of Southwest sludge to sea was being studied.

The plant also began the installation of a dozen new pumps, of a non-clogging type, to move sludge between various points. The new pumps were to replace older pumps which had frequently clogged, tying up plant operations. Four of the new pumps were actually installed during the year to improve sludge circulation in the digester tanks. The other eight will be installed in 1965, bringing appreciable savings in time and money to the Water Department.

Other physical improvements at Southwest included the installation of flow tubes and gas meters in the digestion tanks, a mechanical screen and grinder in the grit chamber, outdoor flood lighting, and various electrical work.

Construction began on a second concentration tank for sludge. The $265,000 tank, to be completed in 1965, will provide less watery sludge for the digester tanks, thus enabling the latter to operate more efficiently. Also under way was the replacement of the roller guides which make it possible for the 160-ton covers of the digester tanks to ride up and down under the pressure of sludge gas.

Southeast Works: The 101 million gallons of sewage reaching the Southeast Treatment Works each day was only 1 M.G.D. more than the previous year. Designed for handling 136 million gallons daily, the plant will be able to meet the needs of its fairly stable service area for many years to come.

A primary treatment plant, Southeast removed 55% of suspended solids and 44% of biochemical oxygen demand from the incoming flow. Solid removal was higher than in 1963.

To make possible more flexible use of plant facilities, a diversion channel was built between the raw sewage pumping station and the grit-and-screening building. The $152,000 channel will interconnect six sets of pumps, bar screens, and grit channels. Thus if one unit fails, it will not affect the operation of related facilities.

Various electrical work, as well as installation of a screenings grinder and shredder, was under way ($87,000).

Sludge is pumped from the Southeast Works to the Southwest Works for digestion.

Minor Improvements: New air piping runs between existing final tanks at the Northeast Sewage Treatment Works. Piping was part of many minor improvements, which supplemented major expansion of the plant.

SEWAGE PUMPING AND INTERCEPTION

Another element in the city's stream clean-up plan had almost been achieved. This was the creation of an intercepting network to pick up sewage from more than 2.000 miles of branch sewers and carry it to the plants.

In 1950, most of Philadelphia's large collecting sewers emptied directly into the rivers. Since then the city has built a network of intercepting chambers, sewage pumping stations, and big intercepting sewers to divert this flow away from the streams. Intercepting sewers extended for nearly 139 miles in 1964—a growth of 77 miles since 1946.

No untreated Philadelphia sewage entered the Delaware River in 1964, but some raw sewage (about 1% of the city flow) was still reaching the lower Schuylkill. Intercepting sewers under construction were expected to pick up this flow in 1965.

Schuylkill West Bank: Nearly completed was a half-mile addition to an intercepting sewer that parallels the west bank of the lower Schuylkill. The $651,000 extension was built through Bartram Park, from 56th Street to 51st, and from there along Botanic Avenue to 49th Street. A vitrified pipe (21 to 24 inches in diameter) in tunnel, the extension will connect with the larger main line, which carries sewage for three miles to the Southwest Treatment Works.

At the end of the year, only an intercepting chamber and a tide gate remained to be completed. The extension is expected to pick up the small amount of untreated sewage still entering the river from the west bank.

Schuylkill East Bank: The replacement of an old intercepting sewer in the East River Drive, extending from boat house row to a point north of Laurel Hill Cemetery, was practically finished. The big brick sewer, built in the 1880's, had been gradually deteriorating under the weight of age and undesirable connections.

The new line, a reinforced concrete box (6½ ft. x 6½ ft.), will bear sewage to another line farther south. The latter connects with the Southwest Works.

The construction was done under five contracts totaling $3.7 million. About 14,700 feet of sewer, valued at $2.8 million, was built in 1964, and more than 3,100 feet the year before.

With only a small segment still to be done and some branch sewers to be connected to it, the new line was expected to go into service early in 1965. Other portions of the old interceptor will be replaced in the future as far as Manayunk, and the sewer will then be extended to the city boundary. The new interceptor will carry only sanitary flow.

A second intercepting sewer ($875,000) was being built in South Philadelphia. A 4-ft. diameter concrete tube, the sewer was just getting under way in 26th Street, from Shunk Street to a point near Hartranft Street. The sewer is a continuation of a 26th Street line built in 1962 between Shunk Street and Penrose Avenue.

Poquessing Creek: Another small addition was made to the extensive Poquessing Creek intercepting system. A sewer was laid for 1,552 feet along Audubon Avenue between Byberry and Woodhaven Roads, and in neighboring areas ($50,000).

Several existing intercepting sewers in various parts of the city were cleaned and cement lined.

Sewage Pumping Stations: Since the early 1950's the Water Department has built or rebuilt seven sewage pumping stations. Four of these are located at the sewage treatment plants, forming an integral part of plant operations. Together the seven stations have a pumping capacity of approximately one billion gallons daily.

Most notable change in 1964 was the addition of two new pumps at the raw sewage station attached to the Northeast Works. The new pumps raised station capacity by 65 million gallons daily to a total of 226 M.G.D. Installed under a $110,000 contract, the extra pumps will provide badly needed reserve power to handle heavy storm flow and to replace pumps that are being overhauled.

Improvements at other stations were minor. Some electrical work was performed at the big Central Schuylkill Station ($2,750), and overhauling of pumps was in progress at that station and the raw sewage station of the Southeast Works ($22,000).

THE GROWTH OF SEWERS

To meet the needs of a rapidly changing city, the Water Department has replaced and expanded portions of its sewer system. The 2,443 miles of sewers of all types reach into every corner of Philadelphia.

During 1964, the department built 37.8 miles of sewers. Allowing for many miles of replacements, the sewer system had grown by a *net* 406 miles in a dozen years.

The new sewers were underpinning the city's progress. They preceded or accompanied the creation of many new neighborhoods and industrial parks. They brought service for the first time to neighborhoods previously dependent on cesspools. They replaced aged, worn out lines, or provided greater relief from storm flooding.

Replacement: Of the $16.7 million invested in sanitary and small storm sewers in 1964, about $11.2 million went into replacement of obsolescent sewers. Nearly 19 miles of replacements were made.

The heavy emphasis on replacement represents an increasing need of the sewage system and a gradual shift in Water Department construction policy. More than 800 miles of city sewers antedate the year 1900. Many of these are 75 to 100 years old and more and more sewers will reach the century mark in the next two decades.

As these sewers grow older, they deteriorate from age and the pounding of overhead traffic. Their replacement becomes more pressing with each year that passes.

The reconstruction of an 89-year old sewer in Germantown Avenue was so urgent in 1964 that the department did the job under a crash summertime program. Nearly a mile of brick sewer was replaced with a reinforced concrete line at a cost of $841,000. The new sewer, built in three sections—between Upsal and Tulpehocken Streets, Haines and Armat Streets, and Dennie and Juniata Streets—ranged from a small pipe (21 inches to three feet in diameter) up to a big box line (8 ft. x 6 ft.). It supplements other portions of the line rebuilt in earlier years.

In South Philadelphia, more than a mile of sewer was completed in Reed Street from 9th Street to a point 715 feet east of Delaware Avenue. The $1,125,000 replacement job, which included the relay of some water mains, had been started the year before.

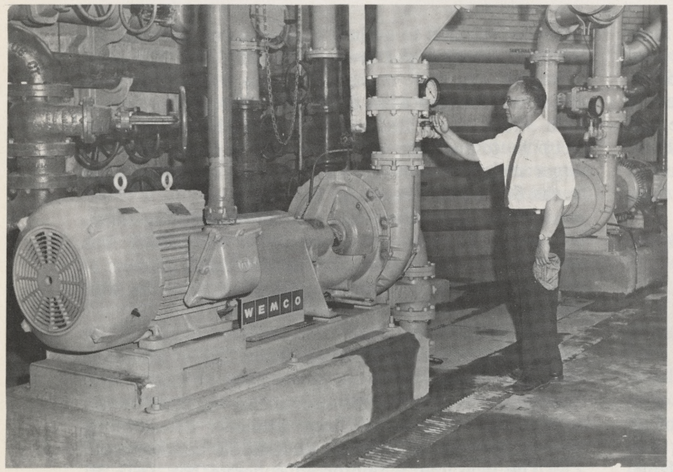
Other significant jobs, mostly in central Philadelphia, included: Three thousand feet in 6th Street between Brown and Popular Streets ($252,000); 2,000 feet in 11th Street between Market and Vine Streets ($302,000); a short piece of the big Willow Street sewer between 3rd and Orianna Streets ($122,000); and 4,200 feet in three portions of Spruce Street ($479,000). About two-thirds done was an $850,000 replacement of sewers and water mains in 13th Street from Mt. Vernon Street to Fairmount Avenue.

New Homes and Industries: More than 11 miles of sewers were laid to service newly developed neighborhoods and industrial parks. Individually small, most of the sewers were built in fast growing Northeast Philadelphia.

The work included, however, a storm water conduit for industries near Philadelphia International Airport ($281,000), and both sanitary and small storm sewers for new homes in Eastwick ($677,000). More than a mile of pipeline was constructed under these contracts, which were well advanced.

Relief of Insanitary Conditions: Though most homes in Philadelphia are connected to city sewers, approximately 4,400 still depend on cesspools. In past years there were many more unconnected homes, but the extension of sewer lines has greatly reduced the number of these. In 1964, the Water Department built four more miles of sewers to bring service to additional homes.

Among the larger jobs completed were sewers in Delaware Avenue between Kirkbride and Jenks Streets and in neighboring locations ($143,000); in Worthington Road from Lindenhurst Street to Byberry Road ($135,000); and in Ridge Avenue from Shawmont Avenue to Port Royal ($200,000). Most unserviced homes are in outlying areas.

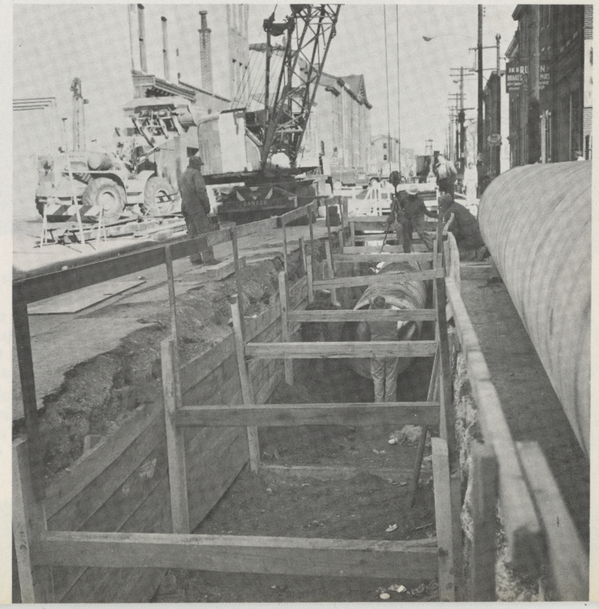


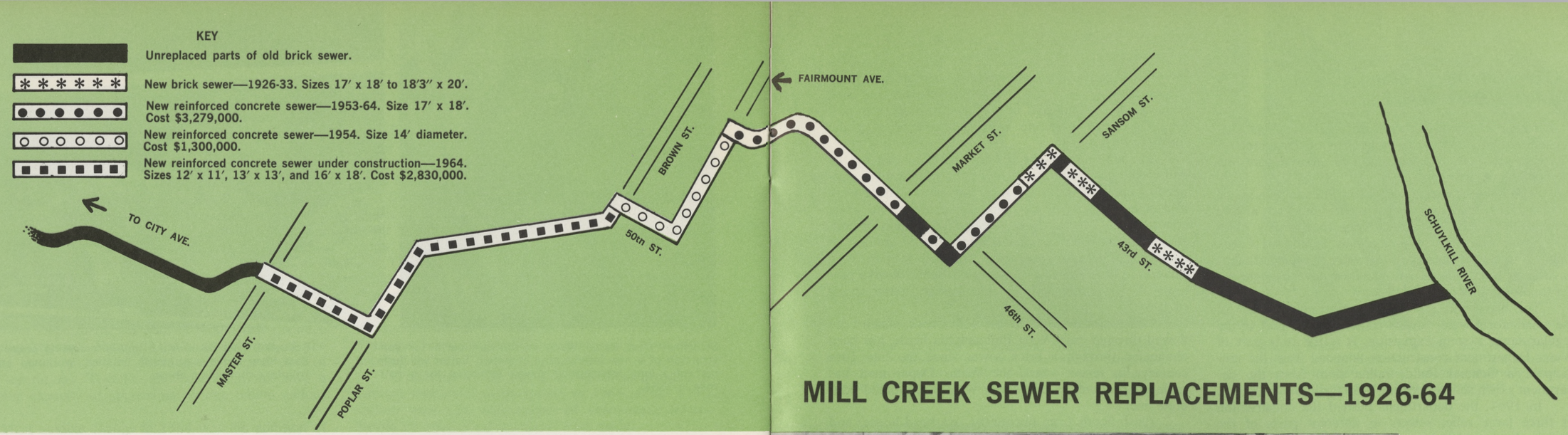
Southwest Sewage Works: Pumps clogged by sewage sludge will soon be a thing of the past. Four new pumps of a non-clogging type (left) were installed in the digester tanks, while a similar pump underwent testing in a settling tank. More will be installed in 1965.

Schuylkill West Bank: Workmen remove earth for construction of a new intercepting chamber. Latter will form part of a long intercepting sewer, extended for a half-mile in 1964.

Schuylkill East Bank: A 3.5 mile intercepting sewer along East River Drive was nearly finished. Workmen place a tributary connection above.

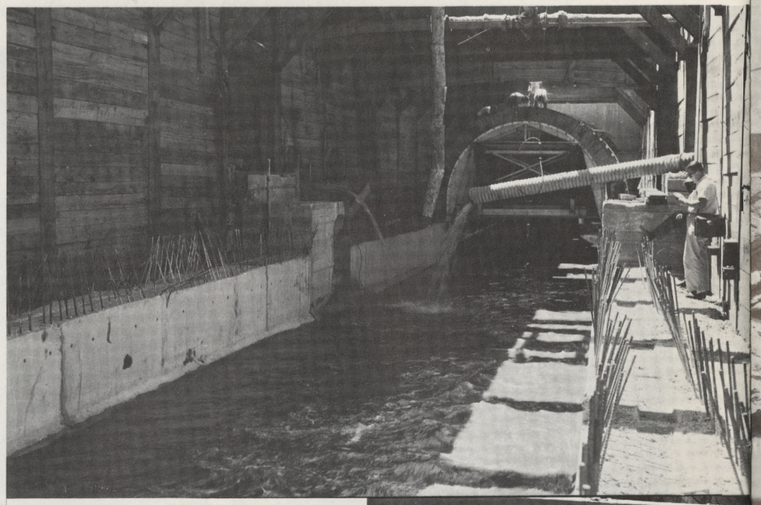
Replacement: More than $11 million was invested in the replacement of old sewers in 1964. The new concrete pipeline in 13th Street below was part of 19 miles of such replacements.



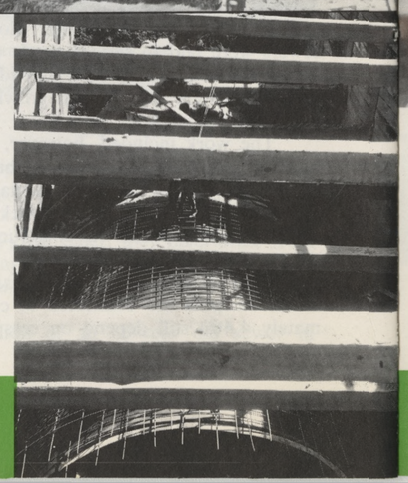


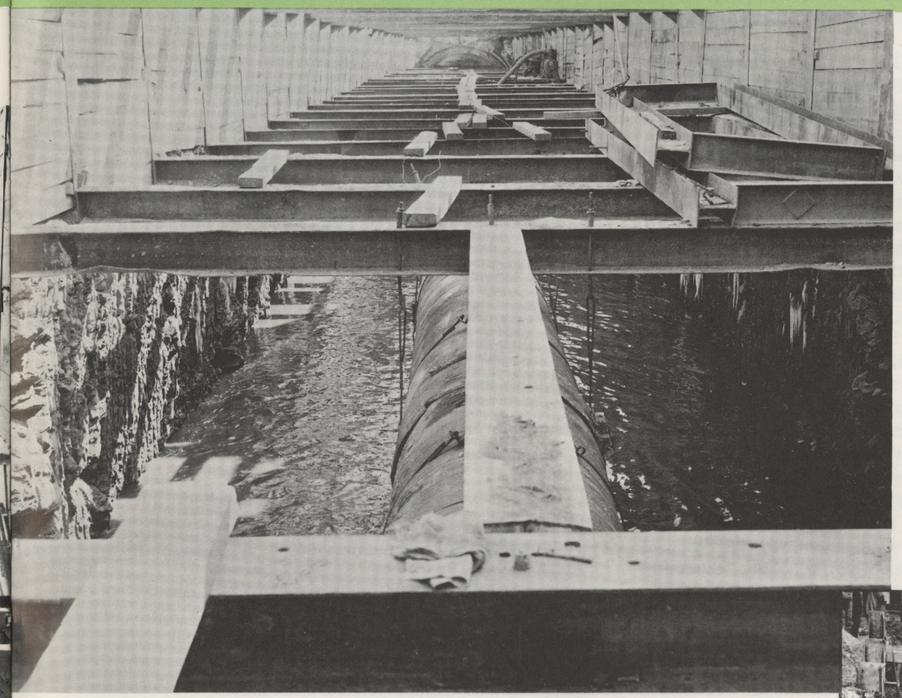
MILL CREEK SEWER REPLACEMENTS—1926-64

Sewers for Industry: This fast growing pipeline in Island Avenue near Philadelphia International Airport will serve new industries in that area. Miles of such lines were laid.



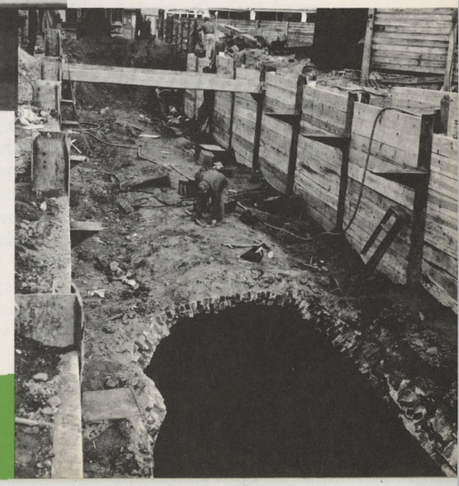
Mill Creek Sewer: For better storm flood control, the old brick sewer was replaced in Farragut Street for 150 feet with a new reinforced concrete line (above). Section of new sewer with reinforcing, right.





Mill Creek Reconstruction: Strong sheathing and shoring pave the way for steadily advancing construction of the new Mill Creek Sewer. The mile of new pipeline running from 50th and Brown Streets to 55th and Master Streets was 75% finished.

Old Mill Creek Sewer: Flash floods rolling down Mill Creek were imposing a growing strain on the deteriorating bricks laid in the 1880's. The bricks were steadily removed in 1964 to make way for the new pipeline.



EXTENSION OF STORM FLOOD RELIEF

With the spread of paved surfaces in a great city, the amount of storm water runoff frequently increases. The result may be the overtaxing of older sewers and the flooding of streets.

Such flooding was so serious in Philadelphia in the 1950's that the Water Department launched a $40 million storm relief program. Since then, many miles of gigantic collecting sewers, a new Frankford Creek channel, and a number of storm water pumping stations have been built. These new facilities have brought relief to important sections of the city.

The big storm relief program is independent of the small storm water sewers constructed as part of the regular sewer system expansion. It is the only part of Water Department construction financed from the municipality's General Fund, rather than from the department's own self-supporting Water and Sewer Funds.

In 1964, the department pushed the construction of three large relief sewers in different parts of the city. It also completed a new storm water pumping station.

Main Relief Sewer: Drier cellars and streets were in sight for many North Philadelphians living west of Broad Street. The big Main Relief Sewer was being further extended in two places.

In past years the sewer had been extended from the Schuylkill River (below Fairmount Dam) northward on 22nd Street to Dauphin Street. In 1964—

(1) The large tube continued to move northward on 22nd Street toward Sedgley Avenue, and from there it would be extended on Sedgley almost to Margie Street. Consisting of an 11-ft. diameter concrete pipe in a tunnel, the $871,000 extension was being built 30 to 50 feet beneath the street level. For much of its length the tunnel must be blasted through solid rock. At the end of the year the contract was one-third finished.

(2) A second, but much smaller, extension was started at what will be the northern terminus of the Main Relief Sewer. This was in 16th Street, reaching from a point 25 feet north of Clearfield Street to a point 95 feet south of Allegheny Avenue. The $211,000 job was one-quarter finished.

Passyunk Avenue Sewer: Many South Philadelphians living west of Broad Street could also look forward to badly needed relief from storm flooding. The 1.4 mile Passyunk Avenue Relief Sewer was largely completed.

Built partly as a box in an open cut and partly as a tube in tunnel, the reinforced concrete sewer will extend along Passyunk Avenue from 16th Street to Ritner Street, continue in Ritner to 24th Street, shoot under the Schuylkill Expressway to the north side of Passyunk Avenue, and empty into the Schuylkill River. It will divert 209,000 gallons of storm water per minute from an overloaded sewer in 16th and Shunk Streets.

Tunneling in 1964 offered constant engineering challenges. Done in soft soil, impregnated with products from petroleum tank farms, the tunneling required very strict safety measures. Well holes were dug to drain off oily water, open shafts were made at intervals, and there were many daily tests for fumes. The soft soil was lined with wooden planks and later steel forms were moved into place, with concrete being pumped between the forms and the planks.

Though most of the tunnel had been dug by the end of the year, flooding delayed the mining of a connection between the two tunnel segments. There were also some branch sewer tie-ins to be made and some concreting still to be done. About $2.6 million of construction had been completed under the $3 million of contracts. The sewer is being financed in part with Federal funds under the Accelerated Public Works program. It is scheduled to go into service in the spring of 1965.

Mill Creek Sewer: The old Mill Creek, which once flowed through quiet West Philadelphia fields, has been channeled through a brick sewer since the late 19th century. In recent years, the Water Department has replaced portions of this sewer with a reinforced concrete line.

Flash floods from upcountry, overhead houses and trucks, and mortar deterioration have put an increasing strain on the old brick structure. At times the structure has collapsed or Mill Creek has burst from its bounds to flood neighboring streets.

In 1964, replacement of the line for a mile—from 50th and Brown Streets to 55th and Master Streets—moved steadily forward. A new concrete box (16 ft. x 18 ft.) took shape, promising greater capacity and strength than the old sewer. About three-quarters of the $2.83 million job had been completed, and the new line was scheduled to be finished by August 1965.

A little farther south—in Farragut Street, from a point 32 feet north to a point 38 feet south of Chestnut Street—the Water Department replaced another piece of the Mill Creek Sewer. About 150 feet of reinforced concrete sewer (17 ft. x 18 ft.) was built under a $184,000 contract.

Other parts of the sewer have been replaced in recent years under contracts valued at $3 million, and the department has additional plans for future reconstruction.

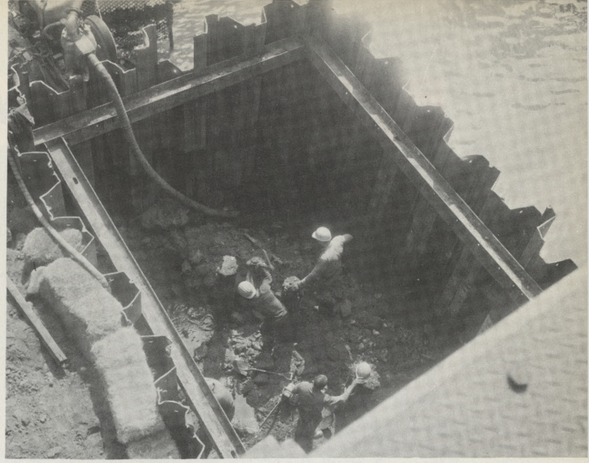
New Mingo Creek Station: Completed, but not put into service, was a $965,000 station which will pump storm water from Mingo Creek into the Schuylkill River.

With an initial pumping capacity of 123,000 gallons of storm water per minute, the new station will serve the growing Eastwick and International Airport areas. It will have an eventual capacity of 235,000 gallons per minute. The new station will be automatic, without need for personnel.

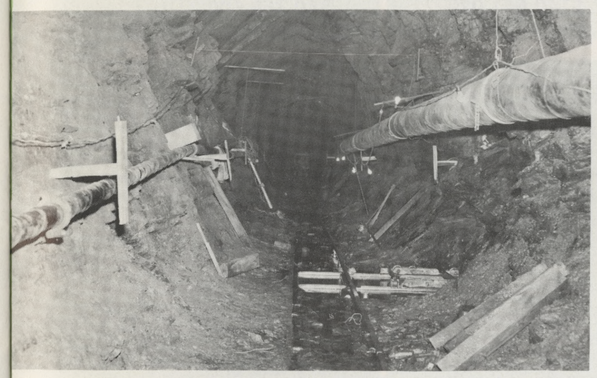
At the close of the year, there were still some minor problems to be solved as a result of test runs on the pumps and other equipment. Meanwhile, an old station, which the new one will replace, continued in operation.

It is planned to deepen and widen the channel of Mingo Creek for more than a mile in 1965. This will create a large surge basin for more efficient collection of storm water.

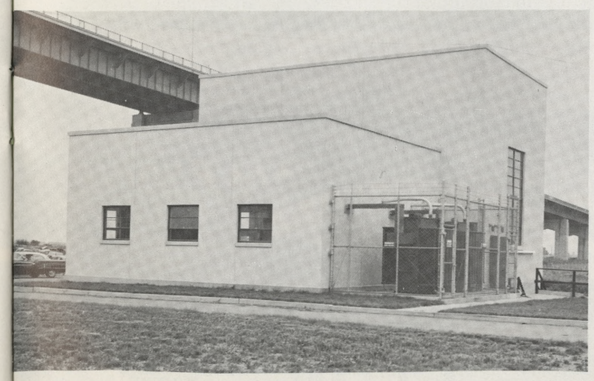
Storm Relief for South Philadelphia: The new $3 million Passyunk Avenue Relief Sewer was nearly completed. The sewer will pour 209,000 gallons of storm water per minute into the Schuylkill River.



Storm Water Outlet: With the Schuylkill River lapping against piling, workmen prepare for construction of an outlet chamber for the Passyunk Avenue Relief Sewer. The sewer will empty into the river here.



North Central City: To provide more relief from storm flooding, the big Main Relief Sewer was being further extended beneath 22nd Street and Sedgley Avenue. The difficult tunneling took place 30 to 50 feet below the street.



Mingo Creek Station: A new $965,000 station stood ready to pump storm water from Mingo Creek into the Schuylkill River. Still to be tested at year's end, the new station will be able to pump 123,000 gallons of storm water per minute initially.

SEWER MAINTENANCE

To keep its far flung sewer system at peak efficiency, the Water Department has laid increasing stress on preventive maintenance.

In 1964, fourteen crews did more jobs and worked more man hours than ever before. In five short years, jobs performed had climbed to 24,216 and man days worked to 23,615—an increase in each case of approximately 63%. The 97 employees, however, represented only a 28% increase.

Because the city has hundreds of miles of old, and often deteriorating sewers, the Water Department has examined an increasing number of sewers. In 1964, maintenance forces inspected 114 miles of old sewers, compared with 85 miles the year before. About 14 miles of these sewers were recommended for replacement.

During the year, the crews repaired 25 sizable sewer breaks, ranging from two to 18 feet in length. Almost four miles of sewers were cleaned, and another four miles rodded or flushed out. With the addition of another crew, cleaning will be accelerated in 1965.

Drainage rights-of-way got much attention, because of debris pushed into them by expanding residential developments. Two hundred forty drainage rights-of-way were inspected, and many of them were cleared or improved. Department crews also inspected, cleaned, and repaired thousands of inlets, manholes, laterals, and small stream beds.

An aid to efficiency was a new branch yard set up for sewer maintenance forces at the Lardner's Point Water Pumping Station. The new yard reduced congestion at the central yard as well as crew travel time.

WATER DEPARTMENT MODERNIZATION

WATER SYSTEM

	Encumbered — Expended 1946 - 1964	Scheduled 1965 - 1970
Load Control Center	$ 540,003	$ 816,800
Torresdale Plant	25,710,012	256,000
Queen Lane Plant	11,460,524	690,600
Belmont Plant	12,305,601	313,600
Water Pumping Stations	10,310,267	1,136,000
Water Mains—Built, Replaced, Cleaned, Lined	62,309,109	35,750,000
Filtered Water Storage	7,402,351	8,538,500
Universal Metering	4,788,064	0
Miscellaneous	3,629,506	0
High Pressure Fire System	2,185,583	3,267,000
Water System Capital Improvements	**$140,641,020**	**$50,768,500**

SEWERAGE SYSTEM

	Encumbered — Expended 1946 - 1964	Scheduled 1965 - 1970
Northeast Works	$ 15,361,713	$ 2,473,400
Southeast Works	6,624,501	89,600
Southwest Works	9,054,080	1,099,400
Sewage Pumping Stations	2,611,123	0
Interceptors	55,320,384	3,505,600
Sewers—Built, Replaced	120,840,089	55,158,700
Miscellaneous	2,296,929	163,900
Storm Flood Relief	26,925,750	4,566,800
Sewerage System Capital Improvements	**$239,034,569**	**$67,057,400**

Community Lifeline: Philadelphia draws half of its water supply from the beautiful Schuylkill River, which has benefited greatly from Philadelphia's sewage treatment program and the clean-up efforts of other communities.

MANAGEMENT AND ENGINEERING SERVICES

TOWARDS EFFICIENT MANAGEMENT

Although new physical facilities have done much to improve Philadelphia's water supply, the updating of Water Department management has also contributed.

To hold down operating costs and to improve service, the department has sought to strength its personnel and fiscal controls, recruit better qualified employees, provide sound training, meet the special needs of its customers, and generally tighten its procedures. In all of this, it has had a substantial measure of success.

The updating of management and related engineering practices will become increasingly necessary in the future. Growing debt service costs for a large capital program will require greater operating efficiency. Sophisticated plants, with "push-button" controls, will require highly trained employees. The desire of the public for rising standards of service will have to be met.

By 1964, the Water Department had become a thoroughly professionalized organization, embracing a wide diversity of skills. About one-quarter of all its employees were engineers, chemists, technicians, administrators, accountants, or in other highly trained categories.* In future years, the percentage will grow, keeping pace with the growing complexity and modernity of the water and sewage systems.

To find new ways of doing things, the Water Department has set up a number of "thought development" units. In 1964 these units were doing extensive research and brainstorming new solutions in a variety of fields, that included water quality control, stream improvement, water and sewer planning, and management changes.

A management study group was kept constantly at work. The group helped to implement organizational changes in sewer maintenance, planned a new library, set up a records retention schedule, and studied the use of microfilm for departmental records.

Typical of such studies was the planning for an engineering computer center. The department planned to establish a computer center to expedite many engineering operations—particularly the study of streams and the design of new water-sewage facilities. Intended to serve other municipal departments as well, the center will begin functioning late in 1965.

*Another quarter were unskilled or semi-skilled, and one-half represented various degrees of skill in clerical, mechanical, electrical, plant operating, and other occupations.

TIGHTENING OF FISCAL OPERATIONS

Fiscal operations, which have been steadily improved for a number of years, were merged in 1963 into a single Fiscal Division. In 1964, these operations were further consolidated. All the budgetary, accounting, and rate making activities of the department were being coordinated by a single chief.

For the second year, the new division worked closely with line officials on the preparation of all budgets —annual operating, annual capital, and six-year capital program. One result of this close cooperation was the development of fuller program statements for operating activities. These statements were keyed to general accounting and cost accounting reports, as well as to budget plans.

To streamline its accounting, the department continued to develop a "reference library" of job procedures for machine tabulating personnel. At the end of the year, plans were also under way for the systematic review of the cost accounting systems.

Accounting personnel processed contracts valued at $23 million during the year. These included 278 contracts for public works and 25 for professional services. Complete inventories of real property, materials and supplies were made.

Much of the credit for integration of the new Fiscal Division and development of its programs belongs to Thomas B. Mullineaux, first division chief, who died near the close of the year.

PERSONNEL DEVELOPMENTS

Water Department employees have decreased steadily for several years. Departmental reorganization, tight management controls, and new, more efficient plants have made this decline possible.

So far had the decline gone in 1964 that personnel strength had fallen far below the department's needs. Because of this, the downward trend was momentarily reversed, as employees increased by 33. At the close of the year, personnel on the rolls numbered 1,594.

Though there were continuing reductions of personnel in some operations (such as the Meter Repair Shop and the pumping stations), these reductions were offset by the urgent need to fill vacancies in other areas. One of the most pressing needs was for young engineers.

Recruitment: To obtain engineering graduates, the Water Department (in cooperation with the City Personnel Department) sent representatives to 18 colleges in the northeastern and midwestern parts of the country. The intensive recruitment, spread through the winter and spring, resulted in the hiring of 17 graduate engineers. Added to nine young engineers hired the year before, the new recruits will provide a vital reserve of talent for higher departmental positions in future years.

During the year, the department also benefited from the services of 46 engineering students working under cooperative programs set up by local schools.

Turnover and Sick Leave: For several years, congenial working conditions have helped to keep personnel turnover at a moderate level. In 1964, the turnover rate was at the lowest point since 1958. It was down to 8.5%, a decline of 1.3% from 1963 and 2.6% from 1962. Total new appointments during the year were 231 (including 89 promotions); separations numbered 198.

Sick leave usage—despite tight controls—rose to 11 days per employee, compared with 9.6 days the year before.

Training: With the increase of modern plants, semi-automatic controls, and laboratories, the Water Department continued to stress technical training. During the year, 63 employees took 17 training courses at colleges, institutes, and plants. These courses covered such subjects as waste treatment, corrosion control, instrumentation, gas chromatography, laboratory analysis, and computers. There was also an intra-departmental course in supervision for management officials.

In line with its "good neighbor" policy, the Water Department cooperated with Pennsylvania State University in the training of water and sewage plant operators from Southeastern Pennsylvania communities. Twenty-two operators, including five from the department, took Penn State's course at the Northeast Sewage Treatment Works. Twenty-four, including 10 from the department, studied at the Torresdale Water Treatment Plant.

The department also held orientation sessions for 103 new employees.

Other: Employees contributed $28,275 to the United Fund—the largest amount which they have given to date.

PERSONNEL CHANGES

The more significant personnel changes in 1964 included:

PROMOTIONS

Charles E. Vickerman, from Chief of Water Operations to Deputy Commissioner in charge of Water Operations, 4/27/64

SEPARATIONS

Samuel Wilson, Chief of Construction Branch, resigned 10/14/64 for a position in private industry

Celestino Pennoni, Civil Engineer III, resigned 2/28/64 for a position in private industry

Louis B. Sklar, Electrical Engineer III, retired 2/13/64
Samuel Halter, Administrative Analyst II, resigned 9/25/64 for a position with another municipality

DECEASED

Thomas B. Mullineaux, Chief of the Fiscal Division, 12/18/64

Edward J. Sweeney, Chief of Schuylkill Pumping Division, 4/27/64

AN IMPROVED SAFETY RECORD

The Water Department's safety record was in some respects the best to date. Thus the disabling accident frequency rate, which measures the number of disabling injuries in relation to the number of man hours worked, was the lowest in nine years. It was down to 13.8, a startling drop from the 68.4 of 1955 when the department began a comprehensive safety program.

With a few slight upward oscillations, the frequency rate has moved generally downward, and in the past three years it has been well in line with industry-wide averages for water utilities.

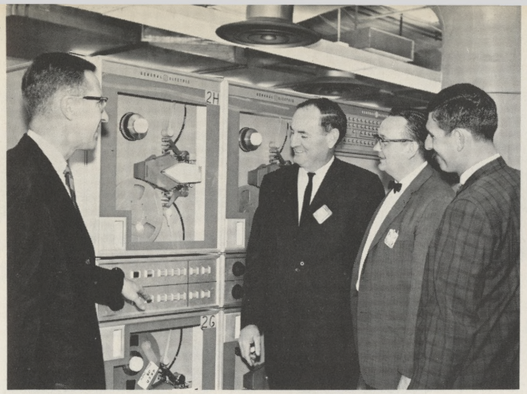
Disabling injuries in 1964 numbered 49, compared with 61 in 1963, while the number of medical treatment cases rose from 127 to 169. Working days lost because of injury dropped from 1,113 to 842.

In contrast to the downward movement of disabling injuries, preventable motor vehicle accidents jumped in 1964 to 122, or 48 more than the previous year. Non-preventable vehicle accidents numbered about the same.

Insofar as the department's safety record was better, this was owing to the continued "education" of employees in safety practices. Safety meetings, periodic discussions, posters, merit awards, and other educational means were extensively used. In addition, the use of safety equipment, which has been increasing yearly, was further extended. Hard hats, safety shoes, and seat belts alone saved 15 employees from serious injury in 1964.

During the year, new safety devices were installed on fixed ladders in the sewage treatment plants, and ventilating systems were placed in a number of sewage metering chambers.

For its accident prevention activities, the department received two safety awards. These were presented by the Philadelphia Safety Council and by the Pennsylvania Section of the American Water Works Association. In addition, 223 employees received individual awards for safe driving from the National Safety Council.



Computer: Plans were made for a new engineering computer center to be set up by the Water Department late in 1965. Water personnel, who will operate the center for other City departments too, visited IBM and other computer centers.

Fresh Talent: As a result of intensive recruitment, 17 new graduate engineers were hired. The new engineers will provide a vital reserve to staff higher department positions in future years.

Safe Driver Awards: For operating City vehicles without a preventable accident for a year, 223 Water Department employees received awards from the National Safety Council.

ENGINEERING SERVICES

In a large public utility like the Water Department, the engineer is a valuable arm of management. Not only does he operate and maintain the extensive water and sewage systems, but he also plans, designs, and constructs.

Though much of this report describes his work, brief note will be taken of some of the auxiliary services which he provides:

Planning: In the chain of engineering services, the Water and Sewer Systems Planning Unit was performing an increasingly valuable role. It made detailed studies in 1964 of several large sewer systems that carry sanitary or storm water flow. These studies were intended to lay the groundwork for future replacement of large portions of such systems.

One of the longest sewers studied was the Wingohocking, which extends seven miles from Chestnut Hill to Frankford Creek. The unit also examined the Mantua Creek sewer to determine the cause of flooding, and studied the Cobbs Creek watershed in cooperation with the U.S. Army Corps of Engineers. Preliminary hydraulic designs were made for the replacement of old water mains and sewers at more than 500 locations.

Design: The Design Branch prepared plans and specifications for $22.5 million of water and sewage facilities. These facilities included water and sewage plants, reservoirs, 58 miles of water mains, and 35 miles of sewers. Because of its personnel shortage, the unit was obliged to farm out some of its work, particularly for old sewer reconstruction, to private consultants.

During the year, 127 reports on drainage, flooding, and underground utilities were prepared. Design engineers also worked closely with the State Highways Department to facilitate laying of water mains and drainage lines near state highways, including the new Delaware Expressway.

Construction: Engineers and inspectors of the Construction Branch were at job sites constantly in 1964. They were responsible for overseeing the work of contractors under 411 contracts, valued at $64 million. The

contracts covered every phase of water and sewage improvements.

Of the contracts under way, 18 were part of the Federal Government's accelerated public works program. The latter were valued at $3.6 million.

The Construction Branch did survey work in part or whole on 264 projects, and worked on or supervised the work of others on 246 return plans. Total personnel rose slightly to 187.

Bowling Awards: Employees kept fit after hours by competing in the department's own bowling league. At the end of the season trophies were passed out to winning teams and to the most skillful players.

A MODERN LABORATORY FOR MATERIALS TESTING

The small staff of the Materials Testing Laboratory moved into spacious new quarters at the Fairhill High Pressure Pumping Station. Left behind were two dreary, crowded, poorly ventilated rooms in City Hall.

For the Laboratory, which tests thousands of purchases made by municipal departments each year, the move was important. For the first time in many years, the Laboratory had the necessary space and physical conditions for its work.

Built at a cost of $321,000, the new quarters cover 12,000 square feet on two floors at the rear of the pumping station. They were built in space that was released when smaller, more compact pumps were introduced into the Fairhill Station as part of extensive modernization.

With 62% more space than it had at City Hall, the new Laboratory will have several advantages. These include attractive rooms, fluorescent lighting, air circulation, and adequate control of moisture, temperature, and fumes. In contrast to City Hall, where parking space was restricted and materials had to be carried up nine floors, the new quarters will receive samples by truck, delivered to a ground floor unloading platform.

Occupying the ground floor will be the physical testing section, filled with a variety of machines. Here samples will be compressed, stretched, weighed, ground, tortured, and otherwise pushed to the limit of endurance. Afterwards, many of them will receive further tests upstairs in the chemical and physico-chemical testing area. The upper floor is divided into a dozen sub-laboratories and offices, for chemical and electronic analysis, weighing, microphotography, etc. The various special "labs" are separated by low partitions of metal and glass that permit a maximum of good lighting from tall windows and high-ceiling lights.

Aided by much new equipment acquired in the last few years, the new Laboratory will be able to operate with increased efficiency.

In 1964, it made more than 25,000 physical and chemical tests on 2,400 samples of materials. In the process, it saved the muncipality large sums of money by assuring good quality in city purchases. Its testing costs were at least 50% less than what the municipality would have to pay annually if all samples were sent to private laboratories. Future savings on testing—thanks to the efficient new quarters—should be even greater.

During the year, Laboratory personnel tested a wide variety of equipment, construction materials, and other products. These included asphalt, bricks, concrete, metals, cement, soils, instruments, coal, petroleum products, roofing materials, paints and pigments, sand, driers, paper, wood, ink, food, seed, fertilizers, soaps, polishes, insecticides, and numerous other materials. About 37% of the samples were submitted by the Water Department, 38% by the Department of Streets, and the balance by other municipal agencies.

Established in 1892, the Materials Testing Laboratory has been operated by the Water Department for the benefit of all city agencies since 1952.

CUSTOMER SERVICE: 136,000 CALLS

Customer Service personnel paid much attention to the special needs of water customers. They responded to 136,000 calls for emergency service or information.

Pouring in by telephone or radio, the calls concerned broken water mains, flooded cellars, discolored or odorous water, interruption of service, low water pressures, leaking meters, open fire hydrants, clogged inlets, and other emergency situations. Requests for general information ran into the thousands, and there were thousands of calls too about private water and sewage problems that were the responsibility of property owners.

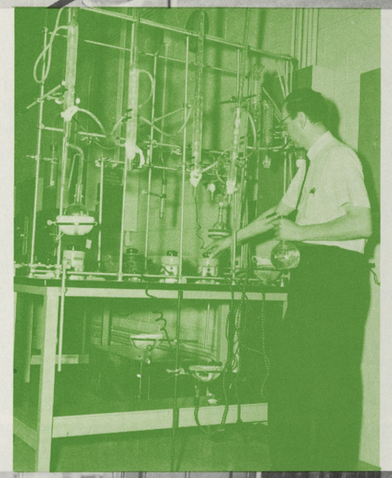
From the department's central service unit, complaints were routed to roving inspectors who checked out the complaints, summoned emergency crews, or advised worried customers. Central personnel and inspectors were on duty 24 hours daily.

Because of a warm summer and mild autumn, service requests were 11,000 fewer than the year before, but the over all activity remained high. More than 66,000 inspections were made and 10,000 violation notices were served.

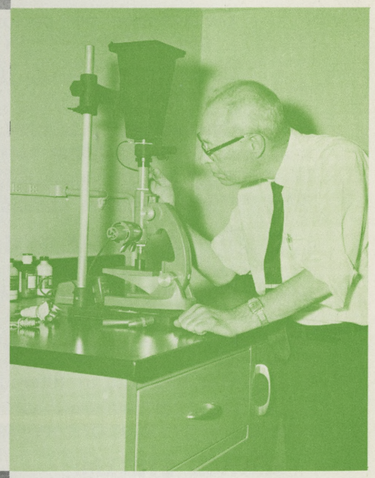
Inspectors also served as an emergency weather patrol during the winter and reported certain types of information to other departments.

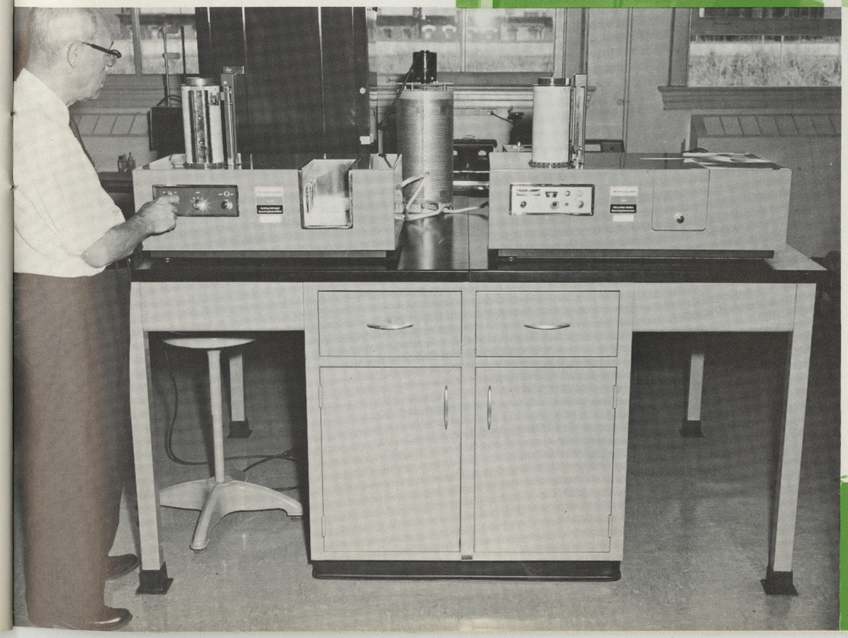
There was continued emphasis on training of personnel in the handling of complaints. A training manual was being prepared.

New Quarters: The Materials Testing Laboratory, which tests City purchases as well as materials used by contractors, moved to spacious new quarters in the rear of the Fairhill High Pressure Pumping Station. Photo, chemical sub-laboratory.



Money Savers: Substantial sums of money are saved for the Water Department and other City agencies by the Materials Testing Laboratory. Distilling equipment and camera aid in the study of various materials.





Electronic Detective: Infrared spectrophotometer is one of many sophisticated devices in the new quarters of the Materials Testing Laboratory. Spectrophotometer identifies new plastic materials.

facts in brief

POPULATION	1964	1963	1954
	2,002,512 (a)	2,002,512 (a)	2,151,000 (b)
WATER SYSTEM:			
Meters in system: Dec. 31	525,984	525,299 (c)	361,000
Unmetered accounts: Dec. 31	1,796	2,435	138,000
Total services: December 31	527,780	527,734	499,000
Consumption per person, average day (gallons)	163.4	163	171
Consumption average day (million gallons)	327.2	326	368.2
Consumption maximum day (million gallons)	473.5(d)	459.1	482.8
Total annual consumption of filtered water (billion gallons)	119.8	119	134.4
Total annual raw water pumped (billion gallons)	126.5	125	141.8
Pipelines in filtered water system (miles)	3,158.3	3,133.5	2,833.4
Valves in filtered water system	71,579	70,302	59,757
Fire hydrants in filtered water system	24,729	24,553	23,053
SEWAGE SYSTEM:			
Sewage treated, average day (million gallons)	364.2	354	95.8
Total sewage treated in year (billion gallons)	133.3	129.2	35
Sewers in system (miles)	2,442.4	2,423.6	2,112.2
HIGH PRESSURE FIRE SYSTEM:			
Pipelines in system (miles)	63.3	63.3	62.94
Valves in system	1,870	1,870	1,874
Fire hydrants	1,044	1,043	1,069

NOTE: (a) U. S. Census, 1960.
(b) Chamber of Commerce estimate.
(c) Includes special rate accounts. Estimate based on billings.
(d) Wednesday, July 1, 1964—temperature 99 degrees F.

FINANCIAL PROGRESS

CURRENT FINANCE

Thanks in part to long range planning, the Water Department's financial position was still very strong in 1964. Income continued to exceed outgo in the self-supporting Water and Sewer Funds, while the department continued to build up vital surpluses to meet inevitable future rises in costs.

So satisfactory was the department's financial position, that water and sewer rates, which had been newly revised in 1962, were expected to remain unchanged for at least five years instead of the four originally envisioned.

Other factors besides long range planning contributed to the department's financial strength. These included: (1) The cyclical billing of water-sewer accounts, (2) reduction of Water Department operating costs below original plans, (3) rising amounts of State aid for the Sewer Fund, and (4) vigorous bill collection. The shutting off of water to properties whose owners refuse to pay their bills has produced a marked rise in current as well as delinquent collections.

The combined surplus of the Water and Sewer Funds increased by $1,107,000 in 1964, raising the total surplus to $10,625,000.

This happy financial picture will change rapidly, however, in the next few years. Outgo is expected to exceed income increasingly, as debt service costs and, to a smaller extent, other obligations climb. Since revenues will change little, the present surpluses in the Water and Sewer Funds will be whittled away.

Water Fund: Though the 1964 income of the Water Fund was slightly below the all time high of 1962, it was at one of the highest levels in its history. Income totaled $22,637,000, an increase of $510,000 over 1963.

Collection of current water charges accounted for most of this revenue. Such collections totaled $17,-112,000, or $277,000 more than the year before. Collections of delinquent bills were also sizable, amounting to $2,065,000. Miscellaneous revenues were strong.

Water Fund outgo—$22,530,000—was $704,000 above the year before. The largest increase was in personal services, because of a $400 individual salary increase given to municipal employees at the beginning of the year. The $5,890,000 personal services outlay was $464,000 more than in 1963. Another large item was debt service, which accounted for 36% of total outgo. Amounting to $8,536,000, debt service costs were $234,000 higher.

Other sizable expenditures included payment of $1,917,000 to the municipality's General Fund and use of $500,000 for "pay as you go" financing of the capital budget. Payments to the General Fund were $196,000 higher. A rise in several other items ($241,000) was offset in part by a drop of $130,000 in the purchase of services.

Notwithstanding the increases in outgo, Water Fund revenues in 1964 were $107,000 higher than obligations. This was a welcome development, for the department's 1962 rate planning had predicted a slight deficit for 1964.

In budgetary terms, total Water Fund income exceeded budgetary estimates by $291,000. This increase in income came from revenue sources other than the sale of water to regular customers. Water sales (both current and past due) to regular customers amounted to $19,177,000 or 99.5% of the predicted amount. Income from other sources ($3,460,000) climbed to 112.6% of estimates, more than offsetting the slight deficiency in regular water sales.

Total water obligations were $160,000 less than available appropriations. Largely responsible was the lapsing of unused funds—$160,000 in personal services, $66,000 in claims and awards, $49,000 in materials and supplies, and $98,100 in other items. These lapses were offset in part by $143,000 of additional charges by the General Fund and $33,900 more by the Pension Fund. At the same time, $248,000 was added to surplus by the merger of encumbrances from prior years.

As a result, the Water Fund closed 1964 with a

Capital Activity—1964

	Water Works	Sewer Works	Storm Flood Works	Total
Capital contracts encumbered January 1, 1964	$14,869,945	$15,168,499	$2,577,987	$32,616,431
Add: Capital work put under way in 1964	8,730,467	14,201,657	117,462	23,049,586
Total: Net capital activity in 1964	$23,600,412	$29,370,156	$2,695,449	$55,666,017
Less: Capital expenditures in 1964	12,870,137	18,912,357	1,319,498	33,101,992
Capital contracts still encumbered December 31, 1964	$10,730,275	$10,457,799	$1,375,951	$22,564,025

cumulative cash surplus of $4,050,000—an increase of $355,000.

Sewer Fund: The income of the Sewer Fund also climbed to a record level in 1964. It amounted to $17,669,000, or $325,000 more than the year before.

Much of the increase was due to stronger collection of sewer charges, with current income rising by $272,000 and delinquent income by $55,000. Other items of income were also higher. Thus sewer charges to other municipalities were up $85,000; interest on daily deposits, $62,000; payments from the General Fund, $57,000; and other revenues, $103,000.

There was a drop of $303,000 in State aid from the previous year, but this drop was in a sense artificial. The Water Department received in 1964, as it had in 1963, the full 2% reimbursement permitted by State law on the capital value of its water treatment plants. In 1963, however, it had also received a partial payment for an earlier year.

Sewer Fund obligations rose by $1,001,000 to $17,083,000 in 1964. Debt service charges accounted for 65.3% of these obligations, as well as for most of the increase in them. The Sewer Fund spent $11,152,000 for debt service, or $738,000 more than the previous year.

As in the case of the Water Fund, a general increase in employees' salaries boosted Sewer Fund expenditures for personal services. The personal services outlay—$1,783,000—was $196,000 greater. Other increases in outlay were: Payments to the General Fund, $140,000; claims and awards, $48,000; payments to the Water Fund, $44,000. The sum of $500,000 was used for "pay as you go" financing of the capital budget.

Despite the various increases in expenditures, Sewer Fund income exceeded outgo by $587,000 in 1964. This was a reversal of earlier expectations.

In budgetary terms, sewer income exceeded revised estimates by $1,265,000: State aid was $548,000 more than expected and total sewer charges $364,000 more; other revenues ran $352,000 over estimates.

Sewer Fund obligations, however, were $83,000 more than available appropriations. This resulted from the following payments in excess of appropriations: To the General Fund, $85,000 more; to the Pension Fund, $42,000 more; and to the Water Fund, $30,000 more. Lapses in appropriations totaled only $74,000. At the same time, $166,000 was added to surplus by the merging of encumbrances from prior years.

As a result, the Sewer Fund closed 1964 with a cumulative cash surplus of $6,576,000—in increase of $752,000.

CAPITAL FINANCE

So many construction goals were attained by the Water Department in 1964 that its capital expenditures climbed to a record level. The department paid out $33,102,000 for a variety of completed projects. This was $8.5 million more than in 1963 and $16.2 million more than in 1962.

Notwithstanding the higher expenditures, the department made fewer new net capital commitments. These commitments totaled $23,050,000, or $5.3 million less than the year before. Behind the decline in commitments was the completion or near completion of many large facilities, as well as a tapering off of the Accelerated Public Works program which had been financed jointly by the Federal and local governments.

The new commitments (encumbered against the 1963 and 1964 capital budgets) included $8,730,000 for the water system, $14,202,000 for the sewer system, and $117,000 for storm flood control. Among larger projects were the new Torresdale Plant intake and related facilities ($2,328,700) and the Schuylkill interceptors ($2,202,000). Most of the remaining money was for water mains and sewers.

Total "net capital activity" (all contracts encumbered on the department's books less recredits on those completed) was $55,666,000.

CAPITAL PROJECTS 1964

WATER PLANTS AND DISTRIBUTION SYSTEMS

Major Projects Completed During 1964

		Cost
1.	Belmont Filter Plant Rehabilitation: Laboratory equipment for Quality Control Building; plumbing, etc. for Quality Control Building; construction of a second outlet consisting of removal of existing steel pipe bend and appurt. work, furnished and installed new 48″ line valve, new steel water piping and appurt. work from Belmont Filtered Water Basin to the E. 48″ steel water main in Monument Avenue; air condition at Quality Control Bldg.	$ 109,863
2.	Fairhill Pumping Station: Conversion for Testing Laboratory; plumbing for Testing Laboratory; furnishing and installing of steam heat and exhaust system for Testing Laboratory and Pumping Station; electrical work for Testing Laboratory.	321,313
3.	Queen Lane Filtered Water Pumping Station: Structures, pumps and piping; power lighting and controls; furnished and installed link fence, including posts, gates, protective wiring and appurt. work.	461,514
4.	Roxborough High Service Pumping Station: Installation of new piping and new valves at Lower Roxborough Filter Plant; construction of 37″ steel water main in Minerva St. from Silverwood St. to Fowler St. and other connections, cleaning and cement mortar lining of existing and new mains, etc. at Upper and Lower Roxborough Filter Plants; disconnection, transporting, installing and modifying, adjusting and testing an existing outdoor metalclad switchgear assembly, etc.	267,606
5.	Torresdale Filter Plant: Landscaping; general construction in connection with conversion of slow sand filters—stage 1; electrical system in connection with conversion of slow sand filters—Stage 1; sealing joints in the existing concrete effluent conduit and appurt. work; water-proofing of four Dry Wells in Flocculator Basins.	1,924,065
6.	Cleaning and cement-mortar lining and replacing line valves in 12″ and 10″ cast iron water mains in various locations.	608,262
7.	Cleaning and cement-mortar lining 60″ and 72″ riveted steel water main in various locations.	111,050
8.	Cleaning and cement-mortar lining and replacing line valves in 12″ and 10″ cast iron water mains at various locations.	200,000
9.	7th Street (both footways) from Columbia Avenue to Girard Avenue.	112,750
10.	Grays Ferry Avenue from Annin St. 28th St. to approx. 87′ ± W. of 36th St.	117,170
11.	Relay of high pressure water mains and appurt. low pressure water main in 12th St. from Market St. to Walnut St.	125,097
12.	20″ cast iron and steel main in Byberry Rd. from Bustleton Ave. to the W. curb line of the Roosevelt Boulevard.	299,587

Some of Larger Projects under Construction at Year's End

			Limit of Contract
1.	W-1101 W-1102 W-1103 W-1104 W-1105 W-1107 W-1342	Belmont Filter Plant Rehabilitation: General construction; filter equipment; electrical system; heating and ventilating system; plumbing system; landscaping; construction of new curbs and sidewalk improvements.	$10,173,750
2.	W-1200 W-1201 W-1305-APW-PA-164G W-1308-APW-PA-166G 1334 1347 1350	Torresdale Filter Plant: General construction at raw water intake; electrical system for raw water intake; general construction in connection with conversion of slow sand filters—Stage 2; General construction in connection with conversion of slow sand filters—Stage 2B; general construction in connection with conversion of slow sand filters—Stage 3; alterations to three lime storage bins including appurt. conveyor and piping work; furnishing and installing new aluminum storm windows and appurt. work, rapid sand filter bldg., metallized zinc coating system on exterior surfaces of the cast iron surface wash water piping in each of ninety single rapid sand filter units and all appurt. work, rapid sand filter building.	4,677,450
3.	W-1165 APW-PA-6G W-1271	Torresdale Filtered Water Pumping Station: New pumps, piping and appurt. work; installation of electrical equipment of Pumping Units Nos. 7, 8 and 10.	159,000
4.	W-988 W-1059 W-1139	Torresdale Raw Water Pumping Station: New pumps, piping and appurt. work; furnishing and installing new plumbing and stormwater system, dismantling steam heating and appurt. work; electrical power supply and control installation for new synchronous pump motors and butterfly valves; and electrical unit heater installation complete with aux transformers, overhead crane modifications and misc. appurt. work.	953,000
5.	W-1320-CDO	Water Mains Construction: Various intersections of the city. 47% Completed	150,000
6.	W-1220-D	Distribution System Rehabilitation: Relay of four 48″ steel water mains in former McMichael St. from Roberts Avenue to Abbottsford Avenue (S); installation of four 48″ cast iron vertical gate valves in Fox Street between Queen Lane and Abbottsford Avenue; installation of 30″ round (Wet) connecting at 29th and Huntingdon St. and all appurt. work. 65% Completed	540,000
7.	W-1300-D	Distribution System Rehabilitation: Removal and of valves in Chambers No. 1, 2 and 3 at location on Lardner's Point Pipe Distribution System. 80% Completed	207,000
8.	W-1326-D	Distribution System Rehabilitation: Cleaning and cement-mortar lining and replacing line valves in 48″, 36″, 30″ and 24″ steel and cast iron water mains at various locations. 80% Completed	465,000
9.	W-1327-D W-1388-D W-1392-D	Distribution System Rehabilitation: Cleaning and cement-mortar lining and replacing line valves in 30″, 20″ and 16″ cast iron water mains at various locations. 60% Completed	1,295,000
10.	PUBLIC PROPERTY BID 4818	Miscellaneous: Underground sewer and water lines adjacent to Underground Municipal Services Garage, 15th and Arch Sts. 76% Completed	300,530

SEWAGE TREATMENT WORKS AND SEWERS

Major Projects Completed in 1964

1.	Reconstruction of intercepting sewer in Fairmount Park from a point 150′ S. of Aquarium Dr. S. to a point along E. River Dr. 950′ N. of Lemon Hill Dr.	$761,000
2.	Northeast Sewage Treatment Works: Furnished and installed complete and ready for service all required electrical equipment for the operation and control	650,201

			Limit of Contract
		of 2-250 H.P., 2300 volts, two (2) ph vert. synchronous motors and their associated motorized discharge gate valves; furnished and installed (2) vertical motor-driven mixed-flow sewage pumps, piping and valves and appurt. work; rehabilitation of Sewage Sludge Digestion Tank No. 1. General construction, electrical, plumbing, heating and ventilating work and appurt work for new Storage Building. Transportation and disposal in the Atlantic Ocean of Digested Sludge from municipal waste treatment processes. Various maintenance replacements.	
3.		Southeast Sewage Treatment Works: Construction of diversion channel piping and appurt. work between the raw sewage pumping station and the screen house.	145,768
4.		Southwest Sewage Treatment Works: Furnished and installed eight flow tubes in digester gallery piping and furnishing, installing and connecting eight meters for measurement of gas from the eight sludge digestion tanks and all appurt. work. General construction work and furnishing and installing mechanical piping for Sludge Lagoon "F" and appurt. work. Furnishing, installing and connecting all required watt hour meters and all appurt. work. Furnishing and installing outdoor electrical flood lighting system and all appurt. work for 8 Sludge Digestion Tanks. Furnishing and installing a new sludge drainage system, etc. in basement area below the sludge heater room, Sludge Handling Building. Replacement of 4 digester circulation pumps and motors with 4 Vortex type pump units.	326,233
5.		Reed St. from a point 715.8 feet E. of Delaware Avenue to 9th St.—Relay of water mains in Reed St. from a point 600′ E. of Delaware Avenue to 9th Street.	1,125,000

Some of the Larger Projects under Construction at Year's End

1.	SD-277-SW	Lower Schuylkill West Side Intercepting System: Construction of intercepting sewer and appurt. chambers in Bartram Park (Fairmount Park), Railroad property and private property from 56th St. to 51st St., etc. 90% Completed	$651,000
2.	SD-297-SW	Lower Schuylkill East Side Intercepting System: Intercepting sewer and appurt. intercepting chamber in 26th St. from R.W. (formerly Shunk St.) to a point 334′ S. of Hartranft St. 2% Completed	875,000
3.	SD-293-SW (Project No. APW-PA-161G)	Upper Schuylkill East Side intercepting system: Reconstruction of intercepting sewer in Fairmount Park from a point along E. River Dr. 950′ N. of Lemon Hill Dr. to a point along E. River Dr. 406′ S. of Fountain Green Drive. 94% Completed	869,000
4.	SD-294-SW	Upper Schuylkill East Side Intercepting System: Intercepting sewer in Fairmount Park from a point along E. River Dr. approx. 406′ S. of Fountain Green Dr., N. of Columbia Avenue Br. 94% Completed	800,000
5.	SD-306-SW (Project No. APW-PA-6250)	Intercepting sewer in Fairmount Park 1500′ N. of Columbia Avenue Bridge to a point along E. River Drive to 316′ N. of Strawberry Mansion Br. 94% Completed	650,000
6.	SD-307-SW (Project No. APW-PA-6240)	Reconstruction of intercepting sewer in Fairmount Park from a point along E. River Dr., approx. 315′ N. of Strawberry Mansion Bridge to a point along E. River Dr., approx. 1790′ N. of Nicetown Lane. 94% Completed	641,700
7.	SD-323-NE SD-341-NE SD-347-NE SD-348-NE SD-351-NE-O SD-361-NE SD-365-NE-O	Northeast Sewage Treatment Works: Additions and modifications for aeration and final settling tanks and all appurtenances. Furnishing and installing motor control center exposed and underground electrical conduit and wiring system, etc. Construction of the extension of the Blower Building and all appurt. work. Furnishing, installing, connecting adjusting and testing an electrical lighting and power installation for the Blower Building ext. including all required blower motor control equipment mercury vapor and fluorescent lighting systems, aux. power panels and supplies, complete with conduit and wiring and all appurt. work. Furnishing and installing,	4,465,000

			Limit of Contract
		connecting and testing an electrical power supply to each of 17 new sluice gate operators, etc. Furnishing, installing, connecting, adjusting and testing an extension to an existing 4000 KVA outdoor substation etc. Transporting and disposal in Atlantic Ocean of digested sludge from municipal waste treatment processes.	
8.	SD-301-SW SD-303-SW SD-308-SW-O SD-309-SW-O SD-312-SW SD-319-SW-O	Southwest Sewage Treatment Works: Furnishing, installing, connecting, and testing electrical power supplies to a gas metering installation by others and all appurt. work. Construction of sludge concentration tanks and furnishing and installing mechanical equipment and piping and appurt work. Furnishing, installing, connecting, and testing electrical power supplies to 4 new digester circulation pump motors (to be furnished by others) and all appurt. work. Removing 64 digester cover roller guides and replacing with 88 new roller guides. Furnishing, installing, connecting and testing electrical power supplies to sludge handling equipment at the primary sludge tanks, the sludge concentration tanks, the sludge and water pump room and all appurt. work. Furnishing and installing a ten inch cast iron sludge line at the south end of digesters and also a six inch cast iron scum ejector line to the lagoons.	470,250
9.	S-2731-E	Eastwick Urban Renewal Area: General construction, mechanical equipment and piping—Mingo Creek Stormwater Pumping Station. 95% Completed	765,000
10.	S-2956-R	Reconstruction of Old Sewers: Mill Creek Sewer from 50th St. and Brown Street to 53rd Street and Poplar Street. 62% Completed	1,700,000
11.	S-2880-RD APW-PA-162G	Reconstruction of Old Sewers: 48″ steel water main (Section 2) 13th Street, Green St. to Poplar St., etc. includes relay of service mains and reconstruction of sewer in 13th St., Mount Vernon St. to Fairmount Avenue, etc. 65% Completed	850,000
12.	S-3096-RD APW-PA-160G	Reconstruction of Old Sewers: Mill Creek Sewer Reconstruction and demolition of structures in Poplar Street from 53rd St. to 55th Street, etc. Relay of water main in Poplar Street (S. Footway) from 53rd Street to 55th St. and in 55th St. (Both Footways) from Poplar St. to Master Street. 86% Completed	1,130,000

STORM FLOOD RELIEF

Under Construction at Year's End

1.	S-2922-F	22nd Street—Dauphin Street to Sedgley Avenue, etc. 37% Completed	$ 915,000
2.	S-3117-F APW-PA-1560	Passyunk Relief Sewer and appurt. work in City property (Phila. Gas Works—Station A) and Private property (N. of Passyunk Avenue) from Schuylkill River to 28th St., etc. 96% Completed	1,135,000
3.	S-3118-FD APW-PA-157G	Passyunk Relief Sewer and appurt. work from a point 86′ N. of Passyunk Avenue to a point 245′ N. of Passyunk Avenue to proposed R/W in private property, etc. 87% Completed	1,050,000
4.	S-3119-FD APW-PA-158G	Passyunk Relief Sewer and appurt. work in Ritner St. from 24th St. to Passyunk Avenue, etc. 98% Completed	815,000
5.	S-3385-FD	16th Street from 25′ N. of Clearfield St. to 95′ S. of Allegheny Avenue—relay of water mains. 25% Completed	211,000

BALANCE SHEET

ASSETS AND OTHER DEBTS

	December 31 1964	1963
Utility Plant		
Utility Plant in Service	$247,143,286	$234,492,311
Construction Work in Progress	6,689,457	5,874,694
Unexpended Construction Authorizations	14,810,880	20,062,936
	$268,643,623	**$260,429,941**
Current Assets		
Cash	$ 5,341,053	$ 5,530,132
Accounts Receivable:		
Customers, for Utility Service	5,632,572	5,949,154
Other	156,666	175,346
Estimated Uncollectible Receivables	(1,848,446)	(2,618,921)
Materials and Supplies at Standard Cost	1,749,923	1,518,666
Advances to Other Municipal Funds	413,998	137,253
Prepaid Expenses	27,834	32,597
	$ 11,473,600	**$ 10,724,227**
	$280,117,223	**$271,154,168**

LIABILITIES AND OTHER CREDITS

Long Term Debt and Other Credits		
Bonds Payable	$103,917,885	$102,876,319
Sinking Fund Assets	(2,801,213)	(2,662,690)
Bond Authorizations Unissued	13,320,000	12,300,000
	$114,436,672	**$112,513,629**
Excess of Utility Plant and Fund Accounts over Long Term Bond Commitments	154,206,951	147,916,312
	$268,643,623	**$260,429,941**
Current Liabilities		
Accounts Payable	$ 458,713	$ 586,665
Payroll Accrued	204,465	159,184
Overpayment of Revenues	66,496	99,456
Advances from Other Municipal Funds	97,450	95,707
	$ 827,124	**$ 941,012**
Surplus and Surplus Reserves		
Reserves for Commitments	$ 913,659	$ 1,041,661
Surplus:		
Invested in Materials and Supplies	1,749,923	1,518,666
Estimated Collectible Receivables	3,940,791	3,505,579
Available for Appropriation	4,042,103	3,717,309
	$ 9,732,817	$ 8,741,554
Total Surplus and Surplus Reserves	$ 10,646,476	$ 9,783,215
	$ 11,473,600	**$ 10,724,227**
	$280,117,223	**$271,154,168**

Statement of Income and Surplus

	For the Year Ending December 31 1964	1963
Operating Revenues:		
Metered Sales	$18,817,697	$18,848,482
Municipal and Other Metered Sales	708,960	745,764
Public Fire Protection	1,077,999	1,065,785
Other Operating Revenues	581,160	518,602
Total Operating Revenue	**$21,185,816**	**$21,178,633**
Operating Revenue Deductions:		
Operating Expenses, other than Maintenance	$ 7,146,481	$ 7,418,041
Maintenance	3,708,084	3,383,617
Total Operating Expenses	$10,854,565	$10,801,658
Charges in Lieu of Depreciation	6,119,001	5,944,026
Total Operating Revenue Deductions	**$16,973,566**	**$16,745,684**
Operating Income	4,212,250	4,432,949
Other Income	312,639	272,147
Gross Income	**$ 4,524,889**	**$ 4,705,096**
Income Deductions:		
Interest on Long Term Debt	$ 3,296,522	$ 3,246,501
Net Income or (Loss)	**$ 1,228,367**	**$ 1,458,595**
Surplus and Surplus Reserves at the Beginning of the Year	$ 9,783,214	$ 8,776,384
Other Adjustments (Net)	(365,104)	(451,765)
Total Surplus and Surplus Reserves at the End of the Year	**$10,646,477**	**$ 9,783,214**

NOTES TO FINANCIAL STATEMENTS

1. Charges in Lieu of Depreciation. The City Charter provides that the rates and charges for supplying water and services shall yield at least an amount equal to operating expenses and debt service charges on any dept incurred or about to be incurred for water supply purposes.
2. Utility Plant in Service. Real property was valued herein at actual cost or engineering estimates where actual cost was not ascertainable. Equipment was valued at cost or replacement value.
3. Unexpended Construction Authorizations. This represents unexpended authorization to complete projects in progress and projects not commenced, as well as unused financing, reimbursements, grants-in-aid, etc.
4. Bonds Payable. The bonds of the City of Philadelphia are all general obligations and, therefore, no bonds are issued by the water system per se. Similarly, a consolidated sinking fund is maintained for the retirement of such bonds. The amounts herein shown represent an apportionment of bonded indebtedness based on bonds issued for water system improvements.
5. Bond Authorizations Unissued. Commitments for capital projects authorized in the City's Capital Budget are made against available sources of financing, which include bond authorizations approved by the electorate or City Council and declared self-supporting by a Court of Common Pleas, and Water Fund operating pay-as-you-go appropriations. This item represents the amount of unissued bonds authorized for water system capital improvements.
6. Reserve for Commitments. Represents contractual obligations of the Fund for the future deliveries of services.
7. NOTE: The Statements are on the accrual basis as distinguished from the city budgetary basis of accounting.

WATER FUND—ANALYSIS OF 1964 BUDGETARY OPERATIONS AND COMPARISON WITH ACCRUAL BASIS STATEMENTS

	Budget Estimate(1)	Actual Receipts	Receipts Compared with Estimates	% of Estimate Realized	Accrual Basis Income(2)
INCOME (by major source)					
Water Sales					
Collections on Current Billing (with penalties)	$17,398,000	$17,111,549	$(286,451)	98.3%	$18,817,658
Collections on Past Billings (with penalties and interest)	1,875,000	2,065,207	190,207	110.1	386,894(2)
Total Water Sales	**$19,273,000**	**$19,176,756**	**$ (96,244)**	**99.5%**	**$19,204,592**
Meter Installations (Water Fund share—60%)	150,100	146,800	(3,300)	97.8	130,122
Miscellaneous Income	287,900	337,703	49,803	117.3	485,043
Interest Earnings	141,000	203,577	62,577	144.4	210,810
Payments from Other City Funds:					
General Fund:					
Water Sales to City agencies, etc.	644,000	839,365(3)	195,365	130.3	708,960(3)
Fire Protection Services	1,025,000	1,077,999(3)	52,999	105.2	1,077,999(3)
Sewer Fund:					
Joint Fund expenses	825,000	855,040(3)	30,040	103.6	838,584(3)
TOTAL INCOME	**$22,346,000**	**$22,637,240**	**$ 291,240**	**101.3%**	**$22,656,110**

OUTGO (by major Object of Expenditure)	Final Appropriations	Final Obligations Amount	% of Total	Lapses Amount	Lapses %	Accrual Basis Expenses
Operations						
Water Operations:						
Salaries and Wages	$ 6,050,000	$ 5,890,215	26.1%	$159,785	2.6%	$ 5,618,480
Purchase of Services by Contract	2,210,000	2,204,536	9.8	5,464	—	2,091,110
Materials and Supplies	3,124,200	3,074,888	13.7	49,312	1.6	2,525,780
Equipment	279,800	277,297	1.2	2,503	.9	882,708
Miscellaneous	1,000	100	—	900	90.0	100
Payments to General Fund:						
Financial services; reading meters, billing, etc.	930,353	1,039,726	4.6	(109,373)	—	1,039,726
Other services rendered	717,647	751,696	3.3	(34,049)	—	751,696
Contributions to Bond Fund	60,000	60,000	0.3	—	.0	60,000
Total Water Operations	**$13,373,000**	**$13,298,458**	**59.0%**	**$ 74,542**	**0.6%**	**$12,969,600**
Employees' Welfare Plan Payments	170,000	142,249	.6	27,751	16.3	142,249
Claims and Awards	90,000	24,169	.1	65,831	73.1	69,345
Employees' Pension Fund Payments	445,000	478,900(3)	2.2	(33,900)	—	475,475(3)
Refunds	50,000	44,989(3)	.2	5,011	10.0	—(3)
Workmen's Compensation	15,000	5,663	—	9,337	62.2	5,663
Provision for Estimated Uncollectible Receivables	—	—	—	—	—	(770,474)(6)
Total Operations	**$14,143,000**	**$13,994,428**	**62.1%**	**$148,572**	**1.1%**	**$12,891,858**
Capital Payments						
Debt Service:						
Amortization of Principal	$ 4,740,000	$ 4,739,364	21.0%	$ 636	—%	$ 4,739,364
Interest	3,307,000	3,296,522(3)	14.6	10,478	0.3	3,296,522(3)
Capital Budget Financing	500,000	500,000	2.3	—	—	500,000
Total Capital Payments	**$ 8,547,000**	**$ 8,535,886**	**37.9%**	**$ 11,114**	**0.1%**	**$ 8,535,886**
TOTAL OUTGO	**$22,690,000**	**$22,530,314**	**100.0%**	**$159,686**	**0.7%**	**$21,427,744**

SUMMARY OF 1964 BUDGETARY OPERATIONS (Original and Actual Budgets)

	Budget Estimate(1)	Actual	Change	Accrual Basis(5)
Surplus, December 31, 1963	**$ 3,783,000**	**$ 3,694,766**	**$(88,234)**	**$ 9,783,215**
Add or (Subtract): Adjustment of Prior Years' Operations	0	248,017	248,017	(365,104)
Add: 1964 Income	22,346,000	22,637,240	291,240	22,656,110
Total 1964 Resources	$26,129,000	$26,580,023	$451,023	$32,074,221
Loss: 1964 Outgo	22,690,00	22,530,314	(159,686)	21,427,744
Surplus, December 31, 1964	**$ 3,439,000**	**$ 4,049,709**	**$610,709**	**$10,646,477**

NOTES:

(1) Budget as proposed by the Mayor and adopted by Council in November, 1963.

(2) On the accrual basis, income is considered as earned when billed, whereas the budgetary basis considers income as earned when collected. Thus collection of the prior years is not considered as income on the accrual basis statements.

(3) These figures reflect respective net adjustments to charges in interfund operations.

(4) Payments made by the Sewer Fund to the Water Fund for general management services is not considered as income on the accrual basis, but as a reduction of operating expenses.

(5) The net increase (or decrease) to the estimated uncollectible receivables is considered an expense on the accrual basis.

(6) Surplus on the accrual basis includes the amounts invested in:
Materials and Supplies
Estimated Collectible Receivables

BALANCE SHEET

ASSETS AND OTHER DEBITS

	December 31 1964	1963
Utility Plant		
Utility Plant in Service	$348,505,121	$334,341,895
Construction Work in Progress	6,830,707	4,262,701
Unexpended Construction Authorizations	19,239,597	27,099,731
	$374,575,425	**$365,704,327**
Current Assets		
Cash	$ 7,622,829	$ 6,798,408
Accounts Receivable:		
Customers, for Utility Service	4,542,628	4,803,103
Other	22,224	10,420
Estimated Uncollectible Receivables	(1,261,491)	(1,308,696)
Materials and Supplies, at Standard Cost	151,816	130,303
Advances to Other Municipal Funds	85,617	197,364
Prepaid Expenses	1,471	3,362
	$ 11,165,094	**$ 10,634,264**
	$385,740,519	**$376,338,591**

LIABILITIES AND OTHER CREDITS

Long Term Debt and Other Credits		
Bonds Payable	$167,666,245	$160,026,125
Sinking Fund Assets	(4,777,233)	(4,567,688)
Bond Authorizations Unissued	20,190,000	24,000,000
	$183,079,012	**$179,458,437**
Excess of Utility Plant and Fund Accounts over Long Term Bond Commitments	191,496,413	186,245,890
	$374,575,425	**$365,704,327**
Current Liabilities		
Accounts Payable	$ 120,871	$ 73,347
Payroll Accrued	72,896	51,050
Overpayment of Revenues	57,326	85,284
Advances from Other Municipal Funds	98,740	32,890
	$ 349,833	**$ 242,571**
Surplus and Surplus Reserves		
Reserves for Commitments	$ 782,893	$ 935,128
Surplus:		
Invested in Materials and Supplies	151,816	130,303
Invested in Estimated Collectible Receivables	3,303,361	3,504,827
Available for Appropriation	6,577,191	5,821,435
	$ 10,032,368	$ 9,456,565
Total Surplus and Surplus Reserves	$ 10,815,261	$ 10,391,693
	$ 11,165,094	**$ 10,634,264**
	$385,740,519	**$376,338,591**

Statement of Income and Surplus

	For the Year Ending December 31 1964	1963
Operating Revenues:		
Metered Sales	$ 14,786,730	$ 14,811,208
Municipal and Other Metered Sales	831,448	732,017
Other Operating Revenues	452,531	356,250
Total Operating Revenues	**$ 16,070,709**	**$ 15,899,475**
Operating Revenue Deductions:		
Operating Expenses, Other than Maintenance	$ 3,879,803	$ 3,258,473
Maintenance	1,327,219	1,080,290
Total Operating Expenses	**$ 5,207,022**	**$ 4,338,763**
Charges in Lieu of Depreciation	6,966,836	6,616,762
Total Operating Revenue Deductions	**$ 12,173,858**	**$ 10,955,525**
Operating Income	3,896,851	4,943,950
Other Income	1,592,444	1,825,333
Gross Income	**$ 5,489,295**	**$ 6,769,283**
Income Deductions:		
Interest on Long Term Debt	$ 4,776,884	$ 4,490,883
Net Income or (Loss)	**$ 712,411**	**$ 2,278,400**
Surplus and Surplus Reserved at the Beginning of the Year	10,391,693	8,457,940
Other Adjustments (Net)	(288,844)	(344,647)
Total Reserves and Surplus Reserves at the End of the Year	**$ 10,815,260**	**$ 10,391,693**

NOTES TO FINANCIAL STATEMENTS

1. Charges in Lieu of Depreciation. The City Charter provides that the rates and charges for supplying sewer services shall yield at least an amount equal to operating expenses and debt service charges on any debt incurred or about to be incurred for sewer supply purposes.
2. Utility Plant in Service. Real Property was valued herein at actual cost or engineering estimates where actual cost was not ascertainable. Equipment was valued at cost or replacement value.
3. Unexpended Construction Authorization. This represents unexpended authorizations to complete projects in projects not commenced as well as unused financing, reimbursements, grants-in-aid, etc.
4. Bonds Payable. The bonds of the City of Philadelphia are all general obligations and, therefore, no bonds are issued by the sewer system per se. Similarly, a consolidated sinking fund is maintained for the retirement of such bonds. The amounts herein shown represent an apportionment of bonded indebtedness based on bonds for sewer system improvements.
5. Bond Authorizations Unissued. Commitments for capital projects authorized in the City's Capital Budget are made against available sources of financing, which include bond authorizations approved by the electorate or City Council and declared self-supporting by a Court of Common Pleas, and Sewer Fund operating pay-as-you-go appropriation. This item represents the amount of unissued bonds authorized for sewer system capital improvements.
6. Reserve for Commitments. Represents contractual obligations of the fund for the future deliveries of services.
7. NOTE: The Statements are on the accrual basis as distinguished from the city budgetary basis of accounting.

SEWER FUND—ANALYSIS OF 1964 BUDGETARY OPERATIONS AND COMPARISON WITH ACCRUAL BASIS STATEMENTS

	Budget Estimate (1)	Actual Receipts	Receipts Compared with Estimates	% of Estimate Realized	Accrual Basis Income (2)
INCOME (by major source)					
Sewer Charges:					
Collections on Current Billings (with penalties)	$13,280,000	$13,297,053	$ 17,053	100.1%	$14,786,730
Collections on Past Billings (with penalties and interest)	1,425,000	1,772,317	347,317	124.4	314,577(2)
Total Sewer Charges	**$14,705,000**	**$15,069,370**	**$ 364,370**	**102.5%**	**$15,101,307**
Sewer Charges to Other Municipalities	382,000	453,741	71,741	118.8	453,741
Meter Installations (Sewer Fund share—40%)	93,000	85,884	(7,116)	92.3	85,767
Miscellaneous Income	139,000	211,019	72,019	151.8	210,528
Interest Earnings	177,000	273,209	96,209	154.3	285,418
Payments from other City Funds:					
General Fund: Sewer services to City agencies	308,000	427,508(3)	119,508	138.8	377,707(3)
State Reimbursement for Clean Streams Program	600,000	1,148,685(3)	548,685	191.4	1,148,685(3)
TOTAL INCOME	**$16,404,000**	**$17,669,416**	**$1,265,416**	**107.7%**	**$17,663,153**

	Final Appropriations	Final Obligations Amount	% of Total	Lapses Amount	Lapses %	Accrual Basis Expenses
OUTGO (by major object of expenditure)						
Operations						
Sewer Operations:						
Salaries and Wages	$ 1,785,000	$ 1,782,940	10.5%	$ 2,060	0.1%	$ 1,761,418
Purchases of Services by Contract	1,138,000	1,135,864	6.6	2,136	0.2	1,129,969
Materials and Supplies	176,000	168,979	1.0	7,021	4.0	143,324
Equipment	111,750	106,754	0.6	4,996	4.5	91,493
Miscellaneous	250	47	—	203	81.2	47
Payments to General Fund:						
Financial services; reading meters, billing, etc.	705,617	787,592(3)	4.6	(81,975)	—	787,592(3)
Other services rendered	201,383	204,633(3)	1.2	(3,250)	—	204,633(3)
Payments to Water Fund:						
Joint Fund Expenses	825,000	855,040(3)	5.0	(30,040)	—	838,584(3)
Contributions to Bond Fund	40,000	40,000	0.2	0	—	40,000
Total Sewer Operations	**$ 4,983,000**	**$ 5,081,849**	**29.7%**	**$ (98,849)**	**—%**	**$ 4,997,060**
Employees' Welfare Plan Payments	69,000	66,810	0.4	2,190	3.2	66,810
Claims and Awards	35,000	11,008	0.1	23,992	68.5	45,050
Employees' Pension Fund Payments	195,000	236,800	1.4	(41,800)	—	236,800
Refunds	42,000	34,006	0.2	7,994	19.0	—
Workman's Compensation	0	0	—	—	—	—
Provision for Estimated Uncollectible Receivables	—	—	—	—	—	(47,205)(4)
Total Operations	**$ 5,324,000**	**$ 5,430,473**	**31.8%**	**$(106,473)**	**—%**	**$ 5,298,515**
Capital Payments						
Debt Service:						
Amortization of Principal	$ 6,376,000	$ 6,375,344	37.3%	$ 656	—%	$ 6,375,344
Interest	4,800,000	4,776,884	28.0	23,116	0.5	4,776,884
Capital Budget Financing	500,000	500,000	2.9	—	0	500,000
Total Capital Payments	**$11,676,000**	**$11,652,228**	**68.2%**	**$ 23,772**	**0.2%**	**$11,652,228**
TOTAL OUTGO	**$17,000,000**	**$17,082,701**	**100.0%**	**$ (82,701)**	**—%**	**$16,950,743**

SUMMARY COMPARISON OF 1964 BUDGETARY OPERATIONS (Original and Actual Budgets)

	Encumbrance Basis Budget (1)	Actual	Change	Accrual Basis (5)
Surplus, December 31, 1963	**$ 4,858,000**	**$ 5,823,305**	**$ 965,305**	**$10,391,693**
Add or (Subtract): Adjustment of Prior Years' Operations	0	165,699	165,699	(288,843)
Add: 1964 Income	16,404,000	17,669,416	1,265,416	17,663,153
Total 1964 Resources	**$21,262,000**	**$23,658,420**	**$2,396,420**	**$27,766,003**
Less: 1964 Outgo	17,000,000	17,082,701	(82,701)	16,950,743
Surplus, December 31, 1964	**$ 4,262,000**	**$ 6,575,719**	**$2,313,719**	**$10,815,260**

NOTES:
(1) Budget as proposed by the Mayor and adopted by Council in November, 1963.
(2) On the accrual basis, income is considered as earned when billed, whereas the budgetary basis considers income as earned when collected. Thus collection of the prior years is not considered as income on the accrual basis statements.
(3) These figures reflect respective net adjustments to charges in interfund operations.
(4) The net increase (or decrease) to the estimated uncollectible receivables is considered an expense on the accrual basis.
(5) Surplus on the accrual basis includes the amounts invested in:
Materials and Supplies
Estimated Collectible Receivables

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