City of Philadelphia
WATER DEPARTMENT

BIENNIAL REPORT
1968 and 1969

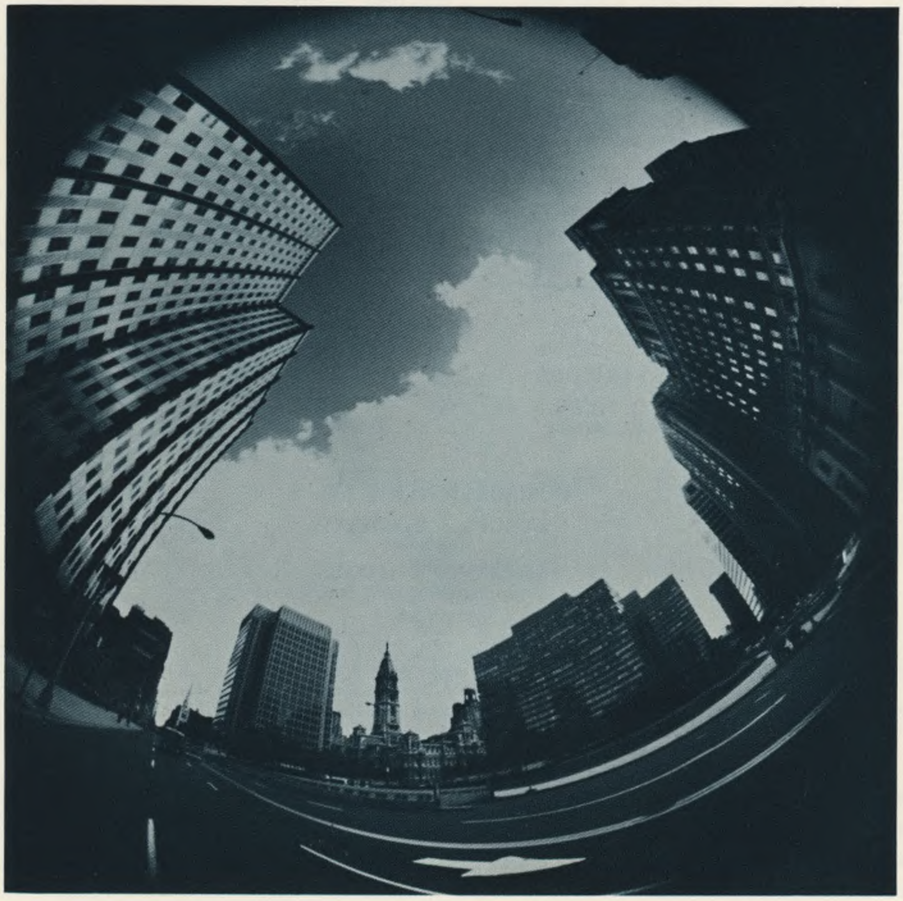
2004.057.0336
C2 OF 2

JAMES H. J. TATE
Mayor

FRED T. CORLETO
Managing Director

SAMUEL S. BAXTER
Commissioner

CITY OF PHILADELPHIA
WATER DEPARTMENT
BIENNIAL REPORT
1968 and 1969



WATER DEPARTMENT

SAMUEL S. BAXTER
Commissioner and Chief Engineer

WATER OPERATIONS

CHARLES E. VICKERMAN
Deputy Commissioner
Water Operations

Division Chiefs

*ELWOOD L. BEAN
Water Treatment

ELMER GOEBEL
Distribution

VICTOR PAGNOTTO
Load Control Center

HENRY F. KALINOSKI
Pumping

**ROBERT F. WALKER
Customer Service

***W. FRANK SCOTT (Ret.)

JAMES ALLEN
Water Main Records

WILLIAM SNYDER
Automotive Maintenance

ADMINISTRATIVE SERVICES

B. BARNEY PALMER
Administrative Services Director

FLOYD PLATTON
Personnel Officer

JACOB BALK
Meter Shop

FISCAL SERVICES

LEIGH B. HEBB
Chief, Fiscal Division

WATER POLLUTION CONTROL

CARMEN GUARINO
Deputy Commissioner
Water Pollution Control

Division Chiefs

GEORGE W. CARPENTER
Wastewater Treatment

†ABRAHAM L. BARMISH (Ret.)

WALTER YOKA
Sewer Maintenance

JACOB S. REICH
Industrial Wastes

FAULKNER EDMUNDS
Drainage Information

ENGINEERING

JOHN BRIGGS
Assistant Chief Engineer

Division Chiefs

KENNETH J. ZITOMER
Design

WALTER H. CLARK
Construction

††JAMES A. BRADY, JR. (Ret.)
Projects Control

†††WILLIAM R. CROOKS (Ret.)

KUMAR KISCHINSCHAND
Testing Laboratory

JOSEPH RADZIUL
Research and Development

COMMISSIONER'S STAFF

SAMUEL J. SCHWARTZ
Assistant

RAYMOND J. HARRIS
Administrative Assistant

* Sub Chiefs: Alan Hess, Delaware Filters; William Thompson, Schuylkill Filters; Charles Pierce (Schuylkill) and Edwin F. Shervin (Delaware) for Water Quality Control.

** Transferred to Commissioner's Staff as Executive Assistant on November 1, 1969. Succeeded by James A. Kenny as Acting Chief.

*** Retired July 2, 1969. Succeeded by James Allen.

† Retired January 31, 1969. Succeeded by Walter Yoka.

†† Retired January 30, 1970. Succeeded by Julian A. Richter.

††† Retired March 28, 1969. Succeeded by Kumar Kischinschand.

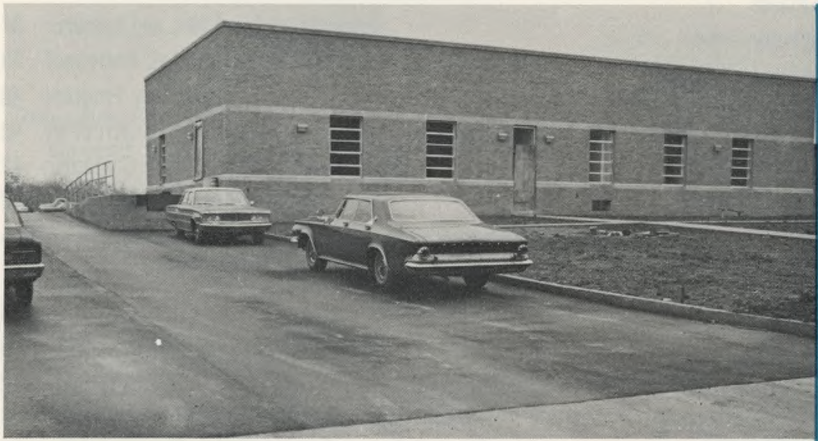
CONTENTS

WHY A BIENNIAL REPORT?

■ The City of Philadelphia decided in 1967 to change its budgetary period from a calendar to a fiscal year. To effect the change, it merged the 18 months from January 1, 1968 through June 30, 1969 into a single fiscal period. A report covering this 18-month period has been submitted by the Water Department to the Managing Director in accordance with the requirement of the City Charter.

For the information of the public, however, it was felt that a two-year report, covering the period from January 1, 1968 through December 31, 1969, would be more timely and more useful. Hence this printed **biennial** report.

Highlights of 1968-69



At the Queen Lane Plant a new building, with automatic equipment, augured further improvements in the city's water.

A new main was laid to carry Philadelphia water to Bucks County.

Another tunnel, 4,000 feet long, was added to a big storm relief sewer.

The proclamation of Willing Water Week stressed the importance of good water.

PLEASE NOTE

The calendric abbreviation "1968-69" will be used throughout this report to denote the two-year period from January 1, 1968 through December 31, 1969.

A computer (studied by operator at left) was installed at the Microwave Center to monitor water pumping stations and other facilities.

■ Of Philadelphia's drinking water, two things could be affirmed in 1968-69: The quality of the water was good, and the city had more than enough of it for every need.

Although once adjudged unsafe for interstate carriers, the city's water had become one of the purest treated waters in America. In purity, color, taste and other factors, it surpassed the standards set by the U.S. Public Health Service, and it was equal to or better than most of the far more difficult standards established by the American Water Works Association.

Much improved in the 1950's, the city's water had been further refined in the 1960's. To this refinement, new plants and modern methods greatly contributed.

Along with quality, water use was finally rising. In 1968, Philadelphians consumed an average of 363.5 million gallons daily, compared with 339 million daily in 1967. During 1969, water use stood at 362.9 M. G. D.

These figures placed water consumption at one of the highest levels in Philadelphia's history. More than a decade of moderate water use had come to an end.

Happily, Philadelphia had no trouble meeting this increased demand. It had created a network of modern water facilities capable of even larger output and delivery. Since the formation of the Water Department in 1952, it had invested heavily in new water treatment plants, pumping stations, water mains and related facilities. Total outlay since 1946 was $184 million.

If the city's water was better and more abundant, it was also more fully protected. By 1968-69, Philadelphia was treating all its sewer-borne wastes, keeping large quantities of pollution out of the Delaware and Schuylkill Rivers. To reduce such pollution, it had spent $298 million on new water pollution control plants, wastewater pumping stations, and sewers since the late 1940's.

These outlays were timely, for wastes were steadily increasing. The flow of wastewater to the water pollution control plants averaged 411.6 million gallons daily in 1968, and 417.9 M. G. D. in 1969. The flows were the highest on record.

SOME URGENT NEEDS

Large as its outlays had been, Philadelphia faced still others in future years. The rising demand for water and the increasing flow of wastewater were portentous of things to come. Several critical challenges loomed before the city.

Future Plant Expansion: Most immediate challenge was an expected regrowth of pollution in the Delaware River estuary. To offset this regrowth, the Pennsylvania Sanitary Water Board and the Delaware River Basin Commission issued new orders in 1968. They directed Philadelphia and other communities to meet new standards of wastewater treatment. To do so, the city will have to expand its water pollution control plants at a cost that will exceed $80 million initially.

Future Automation: To hold down operating costs, improve water treatment, and save the streams from future pollution, the Water Department studied the automation of its plants. To a 1967 study of one water treatment plant, it added the study of two other such plants in 1969. In addition, various sensing devices were field tested at the Northeast Water Pollution Control Plant, where an automation study had been completed earlier. Although it will probably be offset by future savings, the "computerization" of the plants will require an initial outlay of several million dollars.

Improved Water Mains and Sewers: Philadelphia faced a growing need for the replacement of its underground pipes. Wearing out rapidly, hundreds of old water mains and sewers were breaking each year. It was estimated that 600 miles of mains (built before 1890) and 700 miles of sewers (built before 1915) should be replaced by the year 2000. To meet this need, Philadelphia will spend nearly $7 million annually during the next six years, and even larger sums thereafter. In addition, millions of dollars will be needed for other lines to service new homes and industries.

More Inlet Cleaning: Less costly but very pressing was the need to clean thousands of sewer inlets and keep them clean. The duty of clearing the city's 100,000 inlets was transferred from the Department of Streets to the Water Department on April 1, 1968. Lack of funds had led to clogging in past years and delayed significant cleaning until the summer of 1969. The problem remained serious.

CONSTRUCTION IN 1968-69

To meet growing needs, Philadelphia continued to build. It created water and sewer facilities valued at $17.4 million* in 1968, compared with $18.2 million the year before. The outlay for 1969 was $14.2 million.

During the two years, the Water Department did this major work:

1. *A $1.3 million "chemical" treatment building* was almost finished at the Queen Lane Water Plant. The building's automatic equipment will improve the quality of water reaching most residents between Broad Street and the Schuylkill River.

2. *A new reservoir for purified water* was begun at the Queen Lane Plant. Located underground, the $4.3 million basin will hold 50 million gallons and provide a protected reserve for the areas served by the plant.

3. *The microwave network,* which monitors water distribution, was transistorized, and a new computer was installed to digest its flow of information. This $405,000 job will increase the efficiency of water delivery.

4. *Treatment of wastewater sludge* was improved at two water pollution control plants by construction of new centrifuges, heaters, and gas recirculation systems. The contracts, completed in part or whole, totaled $1.7 million.

5. *Three underground pumping stations* were built in Northeast Philadelphia to collect sanitary wastes from unserviced neighborhoods. Costing $322,000, the stations were automatic and unmanned.

6. *To relieve storm flooding, the big Main Relief Sewer* was extended for another 4,000 feet through North Philadelphia. A 10-ft. diameter tube in tunnel, the $1.7 million extension went into service late in 1969.

7. *About 50 miles of water mains and 52 miles of sewers* were built to meet new needs or to replace old facilities. The $25.6 million cost of these represented 80% of 1968-69 capital investment by the Water Department.

OTHER CHANGES

Vital as were the many physical improvements, the Water Department did not neglect the planning, research, and methods that are essential to sound management.

To protect the streams, it (1) acquired a new laboratory-equipped cabin cruiser for mid-stream studies, (2) set up monitoring instruments of an advanced type along the river banks, (3) studied (jointly with a private firm) the microstraining and chemical treatment of storm water, and (4) used chemicals in treatment at its Northeast Water Pollution Control Plant for the first time.

To improve water quality, the department experimented with new chemicals, special filters, and monitoring devices at the water treatment plants.

To solve a growing number of engineering problems, and speed up operating reports from field units, management used a new digital computer extensively. At the same time, technical, supervisory, or other training upgraded the skills of many employees.

Thanks to these and other measures, Philadelphians continued to receive the fine service to which they had become accustomed. The water flowed pure and sparkling to 530,000 homes . . . the streams were more attractive . . . wastes were collected from a widening area . . . more than 320,000 customer appeals for assistance were answered. As if in recognition of this, the Water Department received its third Advancement Award from the American Water Works Association.**

**Based on partial and final estimates in the field.
**Pennsylvania, 1966; national, 1967; Pennsylvania, 1969.

THE WATER SYSTEM

A MODERN SYSTEM TO MEET ALL NEEDS

■ Although water demand rose in 1968-69, Philadelphia's water plants had a wide margin of safety. With a rated capacity of 482 million gallons daily, the plants could supply all the water the city would need.

Conscious of changing patterns of consumption, the Water Department had built for the future — and it now appeared that the future had arrived. Sharply reversing a long-term trend, water demand climbed to a daily average of 363.2 million gallons in the two-year period.

Such demand had fallen in the late 1950's under the impact of stable population, universal water metering, and the systematic detection of leaks in underground pipelines. From a 10-year average of 356.6 million gallons daily (1948-57), water use had dropped to 332.7 M. G. D. in a later period (1958-67).

The reversal of trend augured rising demand in the future. Strong forces were at work — growing population, new water-using devices, and a fairly enduring industrial prosperity. In 1968-69, more water main breaks in the winter, the driest summer (1968) of the century, and much abuse of fire hydrants, also contributed. The highest single-day water use in the department's history—535.4 million gallons—occurred on July 18, 1968.

Fortunately, capacities had been enlarged throughout the city's water system. Of the pumping stations, those on the river could pump up to 700 million gallons daily, while the inland filtered-water stations could pump up to 800 M. G. D. Water storage was approaching a billion gallons. The mileage of water mains had grown enormously.

Throughout this system — in plants, pumping stations, reservoirs, and large distribution valves — automatic and semi-automatic controls had been applied. Water was being treated, monitored, stored and delivered with an efficiency undreamed of 20 years before.

To meet future needs, the Water Department continued to enlarge and streamline the water system. The value of construction in the 24 months was about $11 million.* Some of this construction was shaped by an important goal: The future treatment, storage and delivery of water by computer.

IMPROVED INSTRUMENTATION FOR THE WATER PLANTS

To lay the groundwork for control by computer, the Water Department installed more instrumentation in all the treatment plants. This equipment was of a more advanced type than existing "push-button" devices.

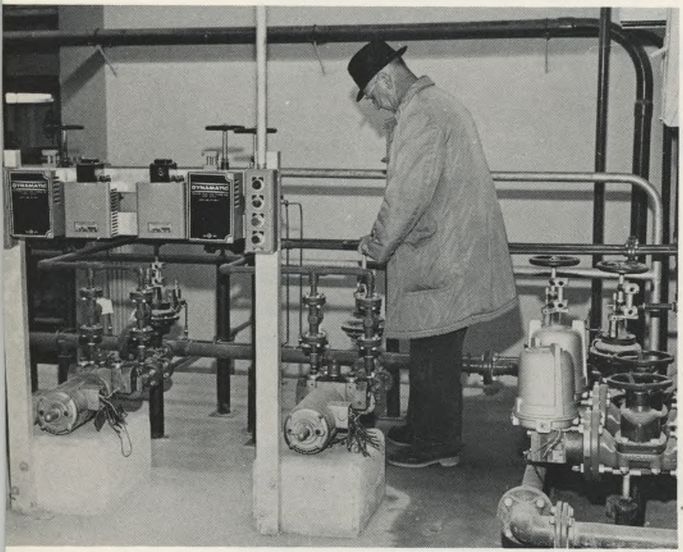
The new equipment was also intended to improve the city's water without waiting for automation.

---

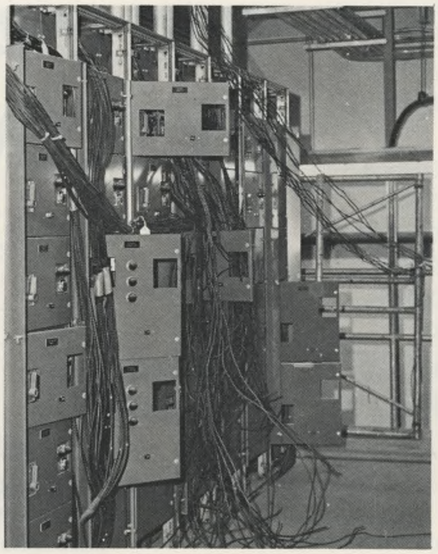
*Based on partial and final estimates in the field. This figure included about $2.8 million for plants and reservoirs and $6.2 million under water main contracts. In addition, an undetermined amount (probably more than $2 million) was spent for water mains under sewer contracts. Other water system statistics for the 24 months: 174 contracts, with a limit of $7.7 million, were completed; 133 contracts, with a limit of $16.4 million, were awarded; 68 contracts, with a limit of $10.4 million, were in force on December 31, 1969.

CHEMICAL BUILDING WILL IMPROVE WATER

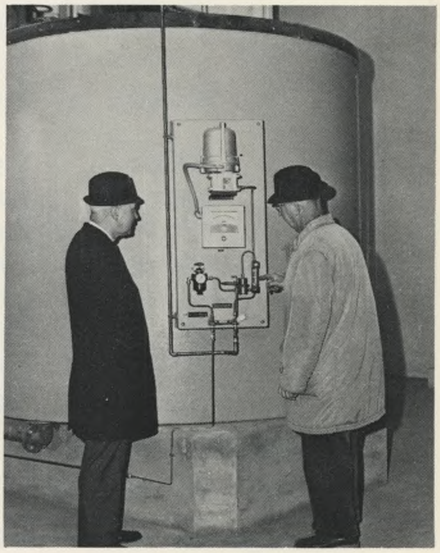
A $1.3 million chemical treatment building (right) was erected at the Queen Lane Water Plant. Housing a variety of tanks and pumps, the new building will store, weigh, mix and apply chemicals used in water treatment. Its automatic equipment (see photos on pages 8 and 9) will permit more precise control of water quality.



For Tastes and Odors: Feed pumps (above) form part of an automatic system that will apply ammonia to water processed by the Queen Lane Plant. The ammonia will remove chlorinous tastes and odors from the finished water.



Switchgear: Miles of electric wires are built into the automatic systems that will control weighing, storing, and feeding of chemicals.



Storage: Large tanks, holding 2,000 gallons each, will store or mix chemicals. An engineer checks measuring equipment (above) on a phosphate tank.

***Queen Lane:** Water customers between Broad Street and the Schuylkill River would be especially affected by a development at the Queen Lane Plant, There a new "chemical" building arose. Built at a cost of $1.3 million, the one-story, brick structure was almost finished.

Housing a variety of tanks and pumps, the new building will store, weigh, mix and apply chemicals used in water treatment. Its electronic and pneumatic equipment will regulate the process with scientific precision, making automatic corrections without human intervention. Chemicals will be applied both before and after the filtration of the river water.

The heart of the new system will be an 18-ft. long control panel, to be lodged in an existing pre-treatment building. This panel will be installed in 1970.

Although semi-automatic equipment has been used for many years at the Queen Lane Plant, the new equipment will permit more exact, flexible and continuous control of water quality.

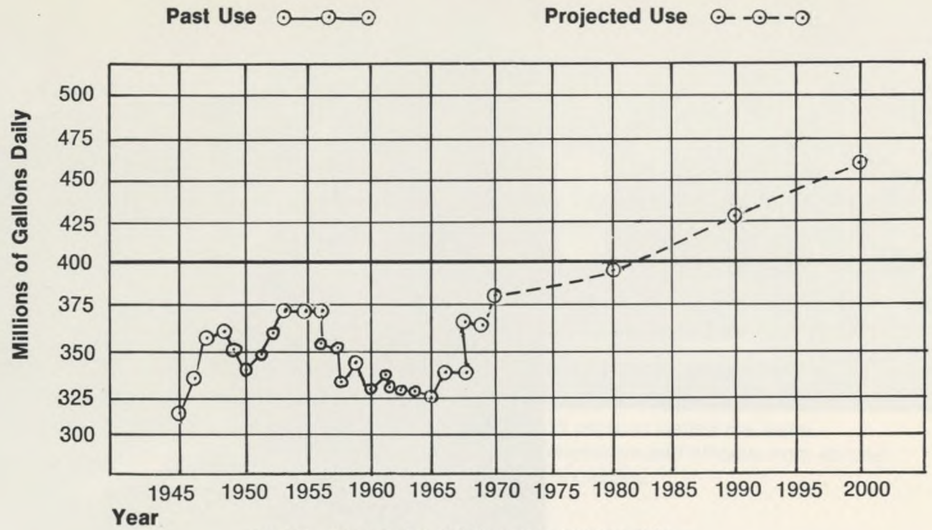
Shaped like a "T", the chemical building measures 124 feet in length and 88 feet at its widest side. Large concrete tanks for receiving and "slurrying" bulk deliveries of chemicals are located below ground level. Precision pumps for chemical feed are set in the basement, while the ground story contains space for electrical, machine and instrumentation shops, as well as rooms for storage, offices, lockers and lunch.

Belmont and Torresdale: Thanks to newly installed controls, the "orders" set on panels were being observed more accurately by some chemical feed equipment at the Belmont and Torresdale Plants. There, new sensing devices measured the dosages of chemicals (as these were injected into the water) and flashed the measurements, in the form of electronic signals, to the panels. The panels compared the dosages with pre-set readings and automatically ordered the feeding devices to make corrections. Previously feed corrections were made by human operators, who lacked information on the accuracy of feeding equipment.

*By the end of 1969, the Reentry Systems Department of General Electric Company had nearly completed a study of automation feasibility at the Torresdale and Queen Lane Plants. The Belmont Plant was previously studied. All studies are under contract with the Water Department.

Measuring Feed: At the new Queen Lane chemical building, pneumatic devices will measure the rate at which carbon, alum and line are applied to water.

***AVERAGE DAILY WATER USE IN PHILADELPHIA**



*Water supplied by public water system only. Does not include water pumped by industries from rivers or wells.

At the Belmont Plant, the new system monitored a variety of chemicals used in water treatment, while at Torresdale it was limited to the chlorination of water passing through the intake at the river. Equipped with alarms, the controls were placed in the pre-treatment buildings of both plants, plus the Torresdale filter building. The contracts totaled $114,000.

In addition, four new chlorinators and two chlorine evaporators went into service at the Torresdale Plant under a $45,000 contract. The chlorinators had a combined capacity of 32,000 lbs. daily — four times the size of units which they replaced. The evaporators added 16,000 lbs. of capacity.

Minor changes at Torresdale included (1) a new automatic turbidity meter for the filters, (2) acid proofing of the alum feed system, $26,000, (3) modification of 94 sets of disc packs on gate valves controlling filter effluent, and new burning systems for the boilers, $21,581. A radio paging system, $4,890, was installed at the Belmont Plant.

FUTURE AUTOMATION OF WATER DELIVERY

To monitor the delivery of water to consumers, a new computer was installed at the Microwave Control Center. At the close of 1969, this solid-state data logger was still being tested.

The new computer will be linked to a highly automated system, which already monitors and controls by microwave more than 100 field points. Capable of receiving data from 200 field locations, the computer will digest the huge quantity of information pouring into the Microwave Center from pumping stations, reservoirs, and distribution valves.

Eventually, operators at the center will no longer have to push buttons to start or stop pumps, or to open or close valves, at distant points. The computer will order such changes automatically.

In anticipation of such computer control, the Water Department transistorized much of its microwave network in 1968-69. Thus vacuum-tube equipment was replaced with solid-state equipment at eight microwave towers as well as at the control center. In addition, 125 solid-state transmitters and receivers were installed at points throughout the city. This work, as well as installation of the computer, was done under contracts totaling $465,000.

By making possible more efficient use of pumps and valves, the new computer will reduce further the costs of water distribution.

THE PUMPING STATIONS: DECLINING COSTS AND RISING DEMAND

The reduction of costs by computer may have heaviest effect in the water pumping stations. By 1968, thirteen of these stations were remotely controlled from the Microwave Center.

Because of such control and modern pumps, the cost of pumping water to consumers had fallen almost uninterruptedly since 1962. In that year it amounted to $12.32 per million gallons, but by 1968 it was down to $10.39. It rose slightly in 1969 to $10.60.

Modernized in past years at a cost of more than $10 million, the pumping stations received few improvements in 1968-69. At the Torresdale Filtered Water Station, a new roof (together with fans and drains) was installed under a $30,000 contract.

With a combined capacity of 1.5 billion gallons a day, the pumping stations were equal to any likely demand. Yet, because of high consumption, two of them had to use all their pumps in the summer months. As a safety measure, therefore, the city planned to install additional pumps at the Lardner's Point and Torresdale Filtered Water Stations in 1970. As water use rises, more pumps may be needed at other stations for emergency support.

Spring Cleaning: Most of the basins, where water settles out its impurities, are cleaned twice a year at the treatment plants. At the Belmont Plant, 6,000 cubic feet of sediment was removed from settling and mixing basins in 1969 (above and right).

START OF THE FOURTH RESERVOIR SINCE 1963

While modern pumps improved the delivery of water, an enlarged water storage backed this delivery. By 1968, the city had added 183.4 million gallons of purified-water storage in five years. For this purpose, it had invested over $9 million.

Consisting of huge, covered grottoes, the new reservoirs were formed from old filter beds no longer in use. These beds, of the slow-sand type, had been replaced by rapid-sand plants.

Because of their cover, the reservoirs were protected from contamination, algae growth, and nuclear fallout. They also provided a useful supply to meet emergencies and peak demand.

So far had conversion of abandoned filter beds proceeded, that the city had only 22 left in 1969 and conversion of these started in February. Located at the Queen Lane Plant, the beds will be transformed into a reservoir holding 50 million gallons. The Federal Government will pay 40% of the $4.3 million cost.

Besides removing sand and gravel, the contractor will interconnect the filter beds, do extensive grouting, and install drainage and pillar support for the roofing. The new basins will also be linked to remote controls of the automatic type.

At the end of 1969, the sand and gravel had been removed from eleven filter beds on the north side, four old coagulation basins had been demolished, and much other work had been done. It was planned to convert the north beds completely before work on the eleven south beds begins. The new reservoir will be in service by 1972; it will be the fourth constructed since 1963.

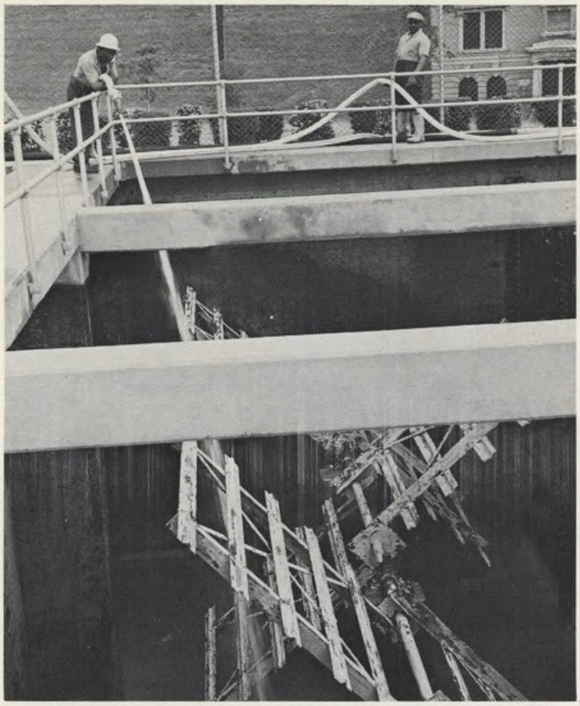
Belmont Reservoir: Another reservoir, which was put into operation at the Belmont Plant in 1967, was linked in mid-1968 to automatic controls. Replacing manual operation, the new controls monitor the water as it flows from the filters to the reservoir and thence to a distribution basin. As water level changes in the basin, sensing devices signal two large valves that throttle or open the flow from the reservoir. At the same time, water level signals reach a control panel, and this panel in turn regulates the output from the filters. Audible alarms also form part of the $27,753 system.

A monorail and a two-ton hoist were installed in the chlorinator building at the Upper Roxborough underground reservoir. Cost: $8,900.

3,200 MILES OF MAINS AND GROWING

Water moved to consumers through an ever lengthening mileage of water mains. Of the 3,215 miles in the system on December 31, 1969, nearly 20% had been laid since 1946. The cost of this huge construction was $89 million.

The rate of construction had accelerated in recent years. In the last decade (1959-69), the Water Department had added 200 miles of pipelines to supply new homes and industries, or to reinforce water pressures in old neighborhoods. In addition, it had replaced 200 miles of old mains.



Mixing Basins: The flocculators, or paddles, above, revolve when water is flowing through the small basins, thus mixing water and chemicals. Periodically, the flocculators must be cleaned.

Because other water works were largely finished, more capital funds were going into water mains. Thus in 1968-69 the department spent over $8 million to build 50 miles of new mains. This was 75% of all capital moneys invested in water works.

Replacement: The problem of replacement was one of the most serious facing the city. There were hundreds of miles of old mains whose future serviceability was doubtful. Because of this, the Water Department planned to spend $3.2 million annually on replacement for many years to come.

Of the city's total pipeline mileage, about 30% dated back to the 19th century. Vibrated by overhead traffic, set at shallow depths, eaten by electrolysis, and often unlined, these old mains were breaking with increasing frequency.

Typical of mains replaced in 1968-69 was a standard-pressure main in 10th Street between Market and Walnut Streets. Laid in 1830, this cast-iron pipeline had outlived its usefulness; it was replaced with a new ductile-iron main. Also replaced was a 54-year old high-pressure main in the same street under the same $200,000 contract.

While replacing many old mains, the city continued to rehabilitate others. About 43 miles of such mains were cleaned and cement lined under contracts totaling $2.8 million. Nearly all these contracts were finished.

The cleaning and lining improved the carrying capacity and extended the life of the mains; it also strengthened water pressures and reduced water discoloration. Of the 300 miles of mains cleaned and lined by Philadelphia since 1947, about two-thirds were rehabilitated in the past decade.

New Services: Because of heavy replacement, the *net* extension of the water system in 1968-69 was only 12.2 miles. Most of this mileage was intended for new homes and industries. Thus in Eastwick—an area that is being redeveloped in Southwest Philadelphia—11 miles of mains were constructed under contracts amounting to $1.3 million. Most other mains for new neighborhoods were laid in the northeast.

A few pipelines were built to reinforce water pressures in existing neighborhoods. One of these—8,700 feet long—was put down in the Lockart Road section of Somerton. Cost: $96,000.

Pipeline to Bucks County: Philadelphia prepared to sell up to 25 million gallons of water daily to water-short areas of lower Bucks County. After many months of waiting, the city received (in mid-1969) a Federal Government grant to build a pipeline from the Torresdale Water Plant to the county line. Construction of the 4-ft. diameter steel main began in the autumn, and the job was scheduled for completion by mid-1970. The Federal Government will pay about half of the $1 million cost.

Although Philadelphia distributes water to two tiny areas outside its borders, the sale to Bucks County will represent its first experiment with large-scale suburban service. The sale results from a 1966 agreement between the city and the Bucks County Water and Sewer Authority. The latter, with federal aid, has built a number of distribution mains to receive the Philadelphia water.

In mid-1969, Philadelphia also received a federal grant for the construction of an 8-ft. diameter tunnel, to carry water from the Schuylkill River to the Queen Lane Plant. This grant will cover nearly half of the $2.75 million cost.

WATER SYSTEM MAINTENANCE

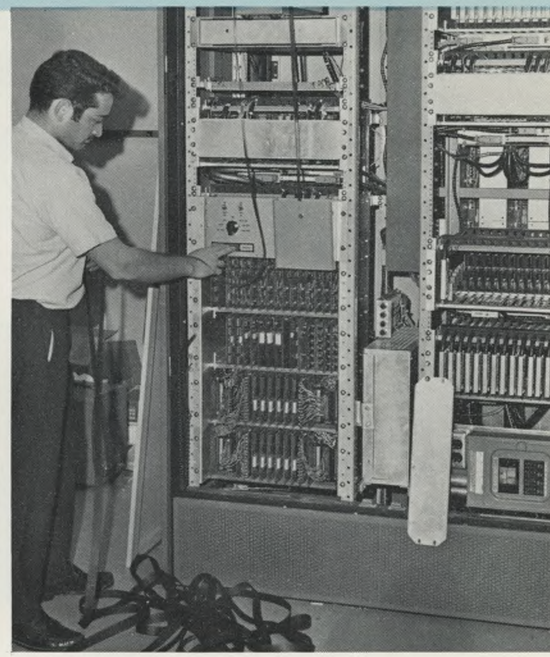
Water Distribution: An old problem plagued the 60 distribution crews during the two summers. This was the illegal opening of fire hydrants. On some days, hundreds of hydrants were opened without permission in some neighborhoods, reducing water pressures and limiting the flows available to fight fires.

Although the Water Department put more than 4,000 locks on the most abused hydrants, human ingenuity broke through the defense. As a result, the department went back to the drawingboards, and it was expected that by the summer of 1970 the city would have a number of "tamper-proof" locking devices in place.

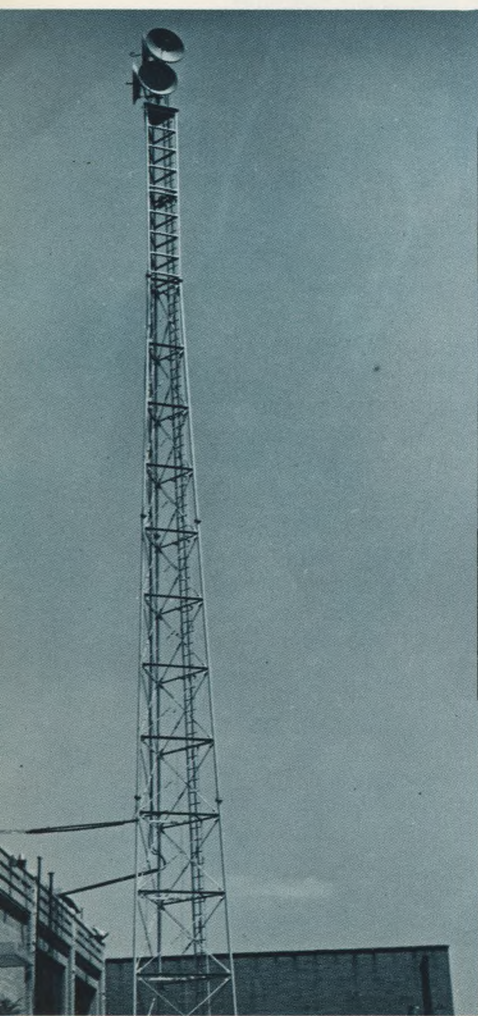
It was not only open fire hydrants that kept the crews busy:

1. Partly because of severe weather, the breaks in water mains jumped to 1,123 in 1968 — a 67% increase over the preceding year — but the 788 of 1969

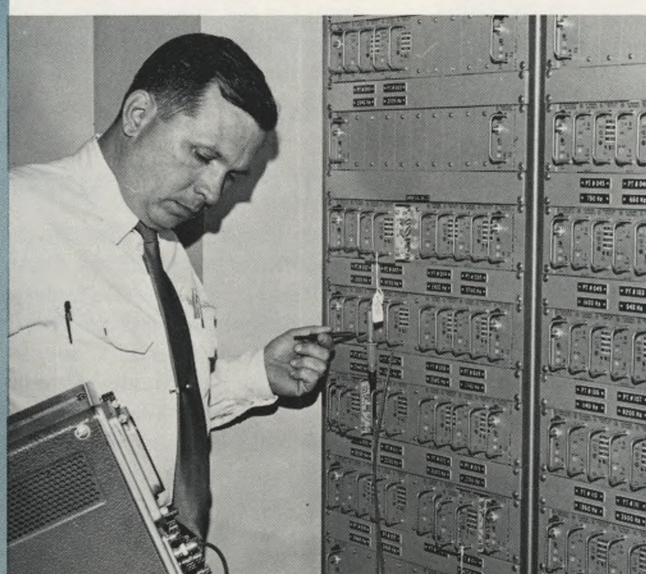
A NEW COMPUTER MONITORS WATER DELIVERY

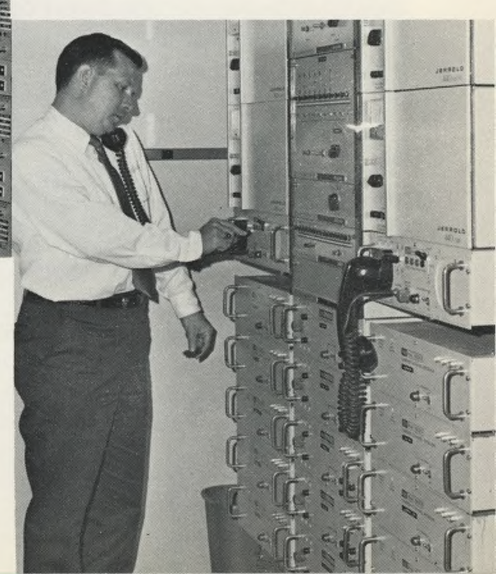


Electronic Watchdog: A computer was installed in the Microwave Center in 1969 to monitor up to 200 field points, including water pumping stations and reservoirs. Eventually, the computer will also regulate these facilities. Above, left, operator at computer console, and right, internal mechanism of the computer.



For Better Microwave Control: Tube-type equipment was replaced with a transistor-type at the Microwave Center and eight microwave towers in 1968-69. The new equipment will be more trouble free. Photos, left, a microwave tower; center, new microwave converting equipment, and below right, new microwave receiving equipment.



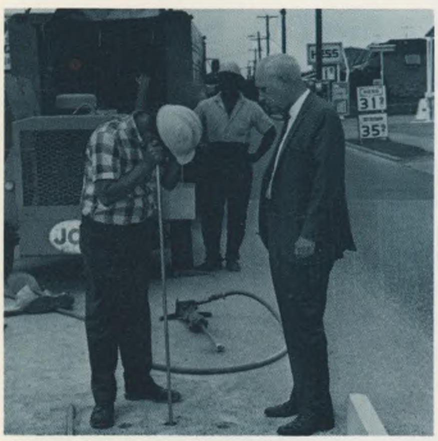


Water Main Break: Every day is an emergency for distribution crews, for water main breaks average two or three a day. In 1968-69, there were more than 1,900. This break occurred across from City Hall.

Valve Shut-off: Turning a large "key," workmen shut off a valve which controls flow through a water main. In 1968-69, distribution crews replaced 2,400 old valves and inspected 84,000 others.

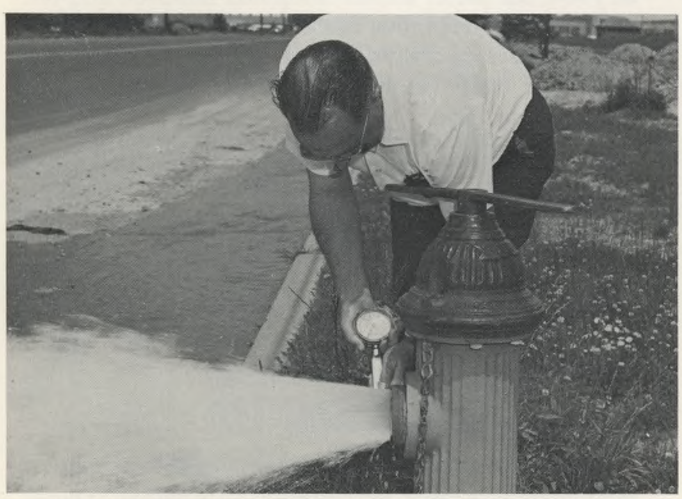
Busy Men Keep The Water Flowing

The outdoors was no stranger to 60 distribution crews. These crews kept the water flowing to consumers in all kinds of weather. The crews performed thousands of maintenance jobs on water mains, fire hydrants, valves, and other facilities.



Water Main Leak: Pinpointing an underground pipeline leak requires a good pair of ears. The foreman (photo) listens "through" a steel rod which has been inserted in a newly drilled hole.

New Fire Hydrant: A hydrant is lowered into place in a residential neighborhood. It is one of 25,000 such hydrants that protect the city.



Checking Water Pressure: To make sure of adequate flow in event of fire, a supervisor checks the outpour of a hydrant. The blade of the delicate measuring instrument is placed against the flow, and the dial shows the pressure in pounds per square inch.

Fire Hydrant Repair: A good crew can disassemble the insides of a fire hydrant in a few minutes. Thousands of hydrant repairs are made each year, and thousands more hydrants are repainted. Hydrants are often inspected twice a year.

were closer to annual averages. For the most part, the breaks were in small pipelines (six inches in diameter or less) built before the year 1900. Nearly all the repairs were made by the distribution crews.

2. To assure more reliable control over water distribution, the crews replaced almost 2,400 valves in water supply mains. Often rusty and difficult to operate, the old valves were renewed under a continuing program. As part of this program, 42,000 valves were inspected annually. This was one of the highest rates of inspection in years.

3. The crews performed thousands of other jobs. They flushed out water mains, made fire flow tests, stopped leaks, removed or installed ferrules, repaired fire hydrants, shut off water service to delinquent customers, and investigated customer complaints. To clear up discolored water problems, they laid over a mile of new pipelines. This was independent of what contractors built.

Building Maintenance: To counteract a growing vandalism, the Water Department organized a 13-man security force in June, 1968. Structured along semimilitary lines, the new force became part of the Building Maintenance Unit.

Linked together by walkie-talkie and radio, the security guards maintained a 24-hour patrol. They quickly reduced theft and vandalism, but their number may have to be increased in the future to protect unattended, outlying facilities.

Repair of vandalized fences, windows, doors, and other property helped to swell maintenance jobs to nearly 2,000 annually. Regular jobs performed by maintenance employees included brickwork, plumbing, and a new catch basin at the Torresdale intake as well as repairs to walls of reservoirs. Some work, including a new roof for the Distribution Headquarters garage and sheds, was done by contractors.

Future Reservoir: To provide space for storing 50 million gallons of purified water, workmen began to clear sand and gravel from 22 old filter beds at the Queen Lane Plant and to make modifications in them. One of the cleared beds above.

Hundreds of maintenance jobs were performed by plant employees in plants and pumping stations.

Logan Garage: With the transfer of sewer inlet cleaning to the Water Department, the work load of the Logan Garage rose steeply. Twenty pieces of old equipment that came with the transfer required extensive repairs.

The garage performed an average of 24,000 jobs annually in 1968-69, compared with 17,000 in 1967. These jobs were done on 364 trucks and passenger cars, and nearly 800 pieces of "off-the-road" equipment. Because of new purchases, the number of vehicles was greater than normal. Besides repairs, the work included preventive maintenance and state inspections.

A GOOD METER IN EVERY HOME

In Philadelphia, universal metering has been a fact for nearly a decade. One of the largest municipal collections in America, the city's 525,000 water meters cover nearly every property. In 1968-69 only 2,000 properties were unmetered, and many of these were vacant.

Because of this universality and efficient maintenance, Philadelphians pay only for the water they use.

1. Today practically every meter is new or improved. As a result, the number of non-registering or otherwise malfunctioning meters was less than 8,000 in 1968, or 1.5% of all meters. This was the lowest number in the department's history. The rate was almost as favorable in 1969.

One reason for the small number of malfunctioning meters was periodic overhaul. In the 10 years ending in 1964, the Meter Repair Shop had removed and reconditioned every meter in the system. This "rotation" program was continuing. So successful had it been, that small meter rotation was slowed down to a 15-year cycle in 1968.

2. Beacuse of the decelerated cycle, the shop completed 64,000 jobs in 1968 and 56,000 in 1969, compared with 77,000 in 1967.

Among the jobs performed were:

	1967	1968	1969
(1) Small meters removed and reset	44,000	39,500	36,900
(2) Portion of (1) rotated	30,000	23,400	22,500
(3) Large meters removed and reset	3,800	3,400	3,400
(4) Portion of (3) Rotated	2,700	2,300	2,400
(5) Meters installed on new services	2,700	2,600	2,200

3. For the 16,675 large meters (one inch or more), there was very little deceleration in rotation. These meters were being thoroughly reconditioned every four or five years. This was because such meters produce 56% of water-sewer revenues attributable to *measured* water consumption, and 38% of all revenues.

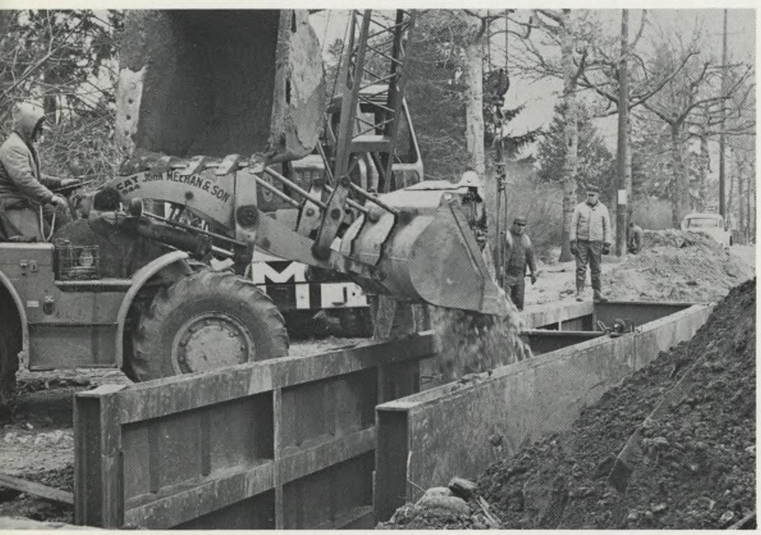
Over 300 large meters underwent major repairs in the field, while minor field repairs were made to 15,000 small meters.

4. The general improvement in the city's meters made possible a further reduction in shop personnel. On December 31, 1969, personnel numbered 51, compared with 62 on January 1, 1968. Because of incentive pay and improved procedures, the employees numbered less than half of what they did in 1962, and only a quarter of the force on the job 15 years ago.

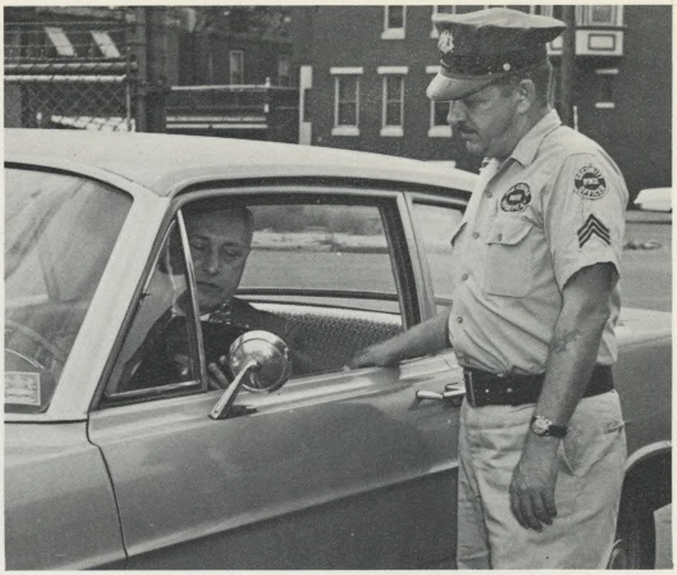
PHILADELPHIA WATER FOR BUCKS COUNTY

A new chapter was being written in the city's water story as a large steel main was laid in Northeast Philadelphia. The main will carry up to 25 million gallons of city water daily to water-short areas of Bucks County. Provided under a "good neighbor" agreement, the water sale will be the first of size by the city outside its boundaries.

With Federal Aid: Four feet in diameter, the steel main moved steadily northward on State Road. The Federal Government agreed to pay 45% of the $1 million price tag.



Racing Against Time: Movable steel shoring, trenching machines, and skilled workmen sped construction of the new main. The 1.7-mile pipeline was scheduled to be in service by the summer of 1970.



A New Security: Growing destruction of Water Department property by intruders forced the department to hire a 13-man security force in 1968. Linked together with walkie-talkie and radio, the new guards quickly reduced theft and vandalism.

WATER TREATMENT PLANTS: OPERATING DATA

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

	1964	1965	1966	1967	1968	1969
TORRESDALE	167.2	167.0	177.0	186.7	203.0	215.4
QUEEN LANE	108.6	108.4	108.1	106.6	110.2	94.2
BELMONT	60.8	60.0	61.3	61.3	63.1	62.1
TOTAL	**336.6**	**335.4**	**346.4**	**354.6**	**376.3**	**371.7**

NOTE: Water consumption in 1968 averaged 363.5 million gallons daily, and during 1969 it averaged 362.9 M.G.D. The difference between these figures and the plant outputs for those years is represented by evaporation and by water used for washing filters.

2. CHEMICAL COSTS FOR TREATMENT (per million gallons)

	1964	1965	1966	1967	1968	1969
TORRESDALE	$ 8.53	$10.14	$10.63	$10.43	$10.15	$ 9.94
QUEEN LANE	10.66	11.06	13.53	13.88	14.24	14.87
BELMONT	8.52	11.15	12.24	10.20	11.96	13.12

NOTE: Total cost of chemicals used in the water treatment plants and reservoirs was $1,660,000 in 1968 and $1,646,000 in 1969, compared with $1,523,000 in 1967.

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

	1964	1965	1966	1967	1968	1969
TORRESDALE	5.60	5.71	5.44	5.68	5.80	5.36
QUEEN LANE	2.06	2.07	2.19	2.01	1.96	2.92
BELMONT	2.29	2.87	2.93	2.71	2.75	2.21

4. ELECTRIC POWER COSTS FOR TREATMENT (per million gallons)

	1964	1965	1966	1967	1968	1969
TORRESDALE	$0.87	$0.87	$0.88	$0.82	$0.73	$0.73
QUEEN LANE	0.47	0.489	0.494	0.52	0.46	0.59
BELMONT	0.987	1.213	1.178	1.14	1.07	1.20

WATER QUALITY AND THE RIVERS

DRINKING WATER NATIONALLY APPROVED

New plants and controls had done much to improve the city's water. By any reasonable test, this water was better than it had been in many years.

- Its purity was one of the highest in America—with a coliform organism count of only 1.8% of what is permitted under the drinking water standards of the U.S. Public Health Service for interstate carriers.
- In freedom from turbidity, color, minerals, hardness, and taste-producing ingredients, it was superior to other standards set by U.S.P.H.S.

Despite these advances, the Water Department continued to improve its treatment methods. It was striving for the still higher standards established by the American Water Works Association for American water utilities. To date, no water utility in the country had attained all the A.W.W.A. standards.

Happily, Philadelphia had already achieved or surpassed most of the A.W.W.A. goals (see table on page 52). Yet one serious problem remained:

In 1968-69, as in past years, the plant chemists wrestled with the problem of odor. Much of the water issuing from the Torresdale and Queen Lane Treatment Plants was chlorinous. Although this odor rapidly dissipated in pipelines and was practically nonexistent at most household taps, it was slightly above the threshold recommended by the U.S. Public Health Service. More than this, it was in conflict with the "odor-free" goal of A.W.W.A.

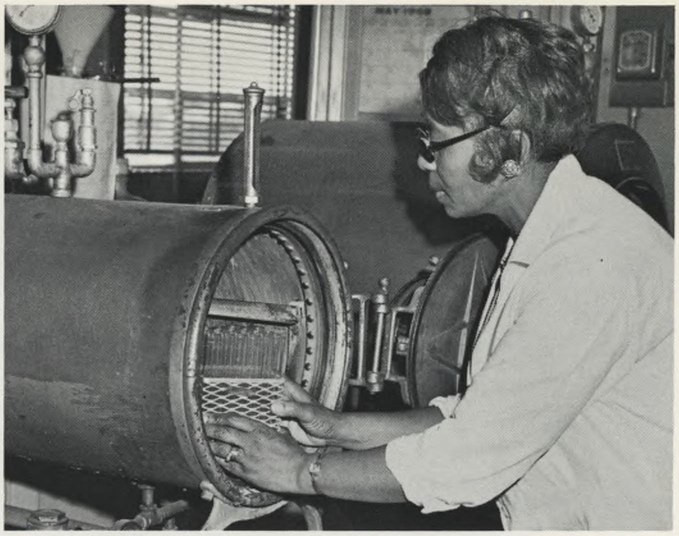
To those Philadelphians who rinsed their glasses free of detergent residues, the chlorinous odor was not noticeable. For the careless, however, the chlorine (however slight) could react chemically with household detergents to cause an obnoxious taste and odor.

The Water Department had resolved this problem in one of the most difficult areas—West Philadelphia. There, in 1967, the Belmont Plant began to add minute doses of ammonia to the water. The ammonia converted the chlorine residuals from "free" to "amines," thus eliminating taste and odor . . . at both the plant and the customer's faucet. At the same time, this treatment improved the carry of chlorine residuals to the far corners of the distribution system, and reduced the corrosion of pipelines.

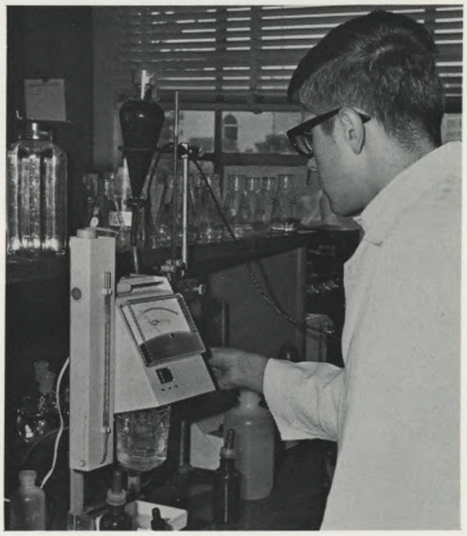
So successful was ammoniation at Belmont, that similar treatment was planned at the other plants. For this purpose, special equipment was installed in a nearly finished "chemical" building at Queen Lane, and such equipment will be placed in the Torresdale Plant in 1970.

Although chlorinous odors may disappear in the future, the department continued to study a lesser problem: This was the "mustiness" which is often characteristic of river water. Studied in many of the nation's laboratories, the removal of mustiness was still far from solution. The isolation and identification of the odor-causing compounds have proved very complex.

Nothwithstanding these difficulties, Philadelphia's water became increasingly palatable. Treatment was



Unending Research: Plant chemists and sanitary engineers made 2.5 million tests on water samples, collected from rivers and from every point in the distribution system. At the Water Quality Research Laboratory, much attention was given to water odors, in the hope of finding new methods of control.



thorough-going and varied. It included free residual chlorination, coagulation with alum or ferric chloride, settlement of impurities, filtration through sand and gravel, and post treatment with chlorine, fluoride and metaphosphates. Carbon or chlorine dioxide was used as required for taste and odor control.

To improve water quality, sanitary engineers studied several changes in treatment:

1. Ferric chloride was studied at the Belmont Plant as a coagulant for suspended impurities. The ferric chloride was used on one-half of the total water flow, while alum was used on the other half. It was planned to repeat this treatment in 1970.

Ferric chloride had been introduced at the Torresdale Plant in July, 1967, and its use was continued in 1968-69. Though higher in cost than alum, much less of it was needed. More important, it made possible the addition of lime to the water at an early stage of treatment, thus assuring good regulation of acidity and alkalinity. This produced a more stable water and eliminated lime precipitation in storage basins after the water left the plant.

2. In the hope of increasing water quality, flow-rate, or filter runs, the department experimented with a "mixed-media" filter at the Torresdale Plant. The sand layer was thinned out in one of the filter beds, and layers of Ferrosand and Anthrafilt were superimposed. As the water flowed through the bed, samples were drawn off through tubes placed between the layers; these samples were tested in a variety of ways to determine the effect of each layer.

Engineers also studied the time required to backwash filter beds. It was hoped to reduce this time from four minutes to three or less, thus saving costly wash water and power.

3. Two small filters of the granular, activated-carbon type were installed at the Queen Lane Laboratory. Plant chemists made several thousand tests to compare the performance of such filters with those of the sand type. Though capable of removing taste-and-odor causing materials from the water, the carbon filters did not appear practical for *single* filtration of the city's water.

4. Personnel of the Belmont Plant devised a special instrument to monitor the turbidity of the water issuing from the north filter beds. The automatic monitor will determine the best time for washing the filters, thus improving filter efficiency. Similar monitoring of the south beds was being planned.

Among other changes in treatment at Belmont—

• Turbidity was kept low in the plant effluent by applying less lime in "post" treatment. This was made possible by splitting the lime dosage between "pre" and post treatment.

• More uniform flocculation and settling times were secured by adjusting the flows to the sedimentation basins.

Chemical costs fell at the Torresdale Plant during the two years, but rose at the other two plants. The difference resulted mainly from different conditions in the Delaware and Schuylkill Rivers. At Torresdale, new instruments for monitoring chlorine at the intake, "pH" in the flocculation basins, and turbidity at the filters, also helped to reduce costs.

To assure fine water from plant to consumer, the department's laboratories made 2.5 million tests on water samples. These included 235,000 physical, chemical and biological tests on samples from water distribution mains alone.

Open Reservoirs: With algae kept under control, the water distributed from the East Park and Oak Lane Reservoirs was generally good. To help maintain this quality, two larger chlorinators were installed at East Park. The units, of 2,000 lbs. capacity each, were five times the size of chlorinators replaced. Control of chlorine residual in the water was automatic.

THE CONDITION OF THE STREAMS

Although the summer of 1968 was the driest in this century, the condition of the river water was good. This was the result of the many efforts of Philadelphia and other communities to protect the streams from pollution.

The summer rainfall was only 4.31 inches compared with 17.19 inches the summer before, and the total precipitation for the year. (35.45 inches) was four or five inches below the long-term average.* This deficiency continued in the first half of 1969, but fresh rains raised the 1969 precipitation level to 43.36 inches, Precipitation in both years was well above the 1963-65 period when drought was at its height.

Because precipitation was less, the flows in the rivers dropped below the long-term averages. In the Delaware River, the fresh flow, as measured at Trenton, averaged 10,078 cubic feet per second in 1968 and 9,785 C.F.S. in 1969. These figures compare with a long-range average (1931-60) of 12,200 C.F.S. In the Schuylkill River, the flow, as recorded at Fairmount Dam, was down to 2,457 C.F.S. in 1968 and 1,790 C.F.S. in 1969; the long-range average (1931-60) was 2,975 C.F.S.**

One result of low flows was low stream turbidity. The turbidity in the upper Delaware estuary averaged 25 parts per million in 1968, while in the fresh water pool formed by Fairmount Dam it was 22 to 31 P.P.M. Average turbidities in both streams were even lower in 1969.

Despite the slackened flows, the dissolved oxygen level of the rivers remained good. Dissolved oxygen averaged eight or nine parts per million at the city's fresh water intakes on both rivers in 1968 and 1969. As a result, the rivers posed few taste and odor problems for the treatment plants.

Other chemical characteristics of the river water were normal. Coliform organism counts (a measure of pollution) were in line with the averages for the preceding 10-year period. Compared with 1967, the number dropped in 1968 by 23% at the Belmont intake and 38% at the Queen Lane intake.

The reduced rainfall raised the hardness of the Schuylkill River water, but the hardness of the normally soft Delaware water turned down after rising. Measured in grains per gallon, the average annual hardness of the two streams was as follows:

	1967	1968	1969
Schuylkill	8.2	9.5	10.2
Delaware	3.8	5.8	3.8

*As measured at Philadelphia International Airport. Long-term averages: 40.91 inches for the period 1872-1966; 42.48 inches for 1931-60; and 39 inches for 1958-67.

**All flow figures for the Delaware River at Trenton are unadjusted for upstream diversions. Flow figures for the Schuylkill River at Fairmount Dam have been adjusted to reflect withdrawals of water from the river by Philadelphia . . . Rainfall upriver made river flows higher in 1968 than in 1969, despite lower rainfall in the Philadelphia area.

For River Study: Capable of 19 knots, this speedy cabin cruiser will improve the Water Department's study of the Delaware River estuary. The cruiser, delivered in 1969, makes possible the collection of water samples from all parts of the river.

WATER QUALITY IN PHILADELPHIA — 1968

As Measured Against the National Standards of the U.S. Public Health Service and the Goals of the American Water Works Association

(Figures in Milligrams per Liter, Unless Otherwise Noted)

TABLE I: Maximum Monthly Averages

	Torresdale Plant	Belmont Plant	Queen Lane Plant	USPHS Standards
Turbidity (JTU)	0.1	0.33	0.03	5.
Color (Pt. — Co. Std. Units)	0	2.	1.	15.
Odor (Threshold Units)	4.	2.	3.	3.
Aluminum	0.10	0.07	0.02	0.3
Iron	0.04	0.07	0.10	0.3
Manganese	0.00	0.04	0.03	0.05
Copper	0.00	0.03	0.03	1.
Filterable Residue (T.D.S.)	214.	430.	412.	500.
Methylene Blue Active Substances	0.11	0.12	0.14	0.5
Hardness, in terms of $CaCO_3$	113.	236.	206.	—
Lead	0.000	—	—	0.05
Chromium (hexavalent)	0.000	0.010	0.007	0.05
Nitrates and Nitrites (N)	1.14	3.32	3.36	10.0
Phenols	0.000	0.001	0.001	0.001
Chloride	33.	55.	57.	250.
Sulfate	35.	132.	135.	250.
Coliform per 100 ml (MPN)	0.0	0.10	0.19	1.0
Radioactivity (pc/l)	4.9	5.3	6.6	1000.

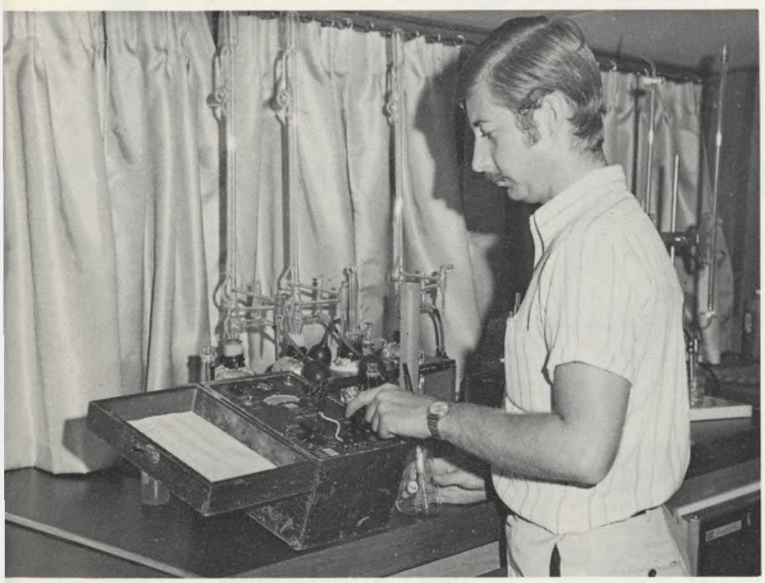
TABLE II: Yearly Averages

	Torresdale Plant	Belmont Plant	Queen Lane Plant	AWWA Goals
Turbidity (JTU)	0.0	0.21	0.01	less than 0.1
Color (Pt. — Co. Std. Units)	0	1.	0	less than 3.
Odor (Threshold Units)	1.	2.	1.2	no odor
Aluminum	0.04	0.03	0.02	less than 0.05
Iron	0.02	0.03	0.05	less than 0.05
Manganese	0.00	0.01	0.01	less than 0.01
Copper	0.00	0.02	0.02	less than 0.2
Filterable Residue (T.D.S.)	176.	318.	310.	less than 200.
Methylene Blue Active Substances	0.08	0.08	0.08	less than 0.2
Hardness, in terms of $CaCO_3$	99.	173.	153.	80.-100.
Lead	0.000	—	—	0.05
Chromium (hexavalent)	0.000	0.006	0.005	0.05
Nitrates and Nitrites (N)	0.73	2.53	2.72	10.0
Phenols	0.000	0.001	0.000	0.001
Chloride	30.	39.	45.	250.
Sulfate	29.	90.	91.	250.
Coliform per 100 ml (MPN)	0.0	0.0	0.01	None
Radioactivity (pc/l)	3.6	4.0	4.7	100.

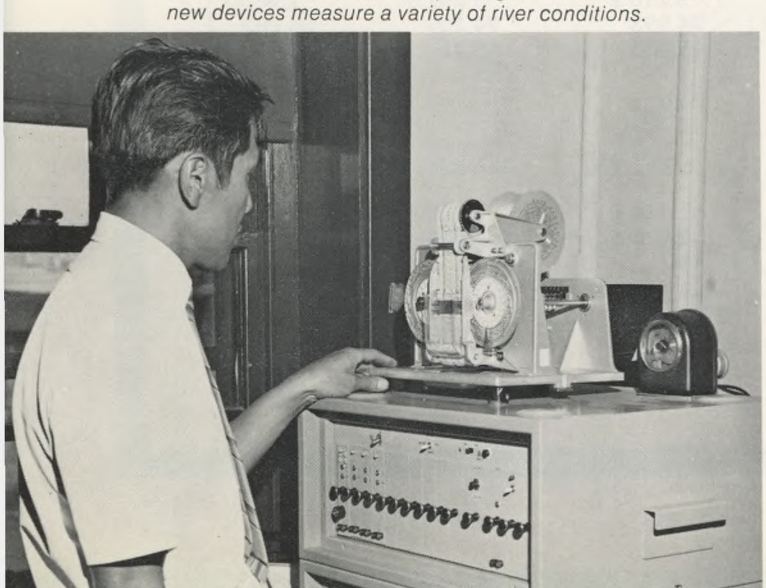
Is Philadelphia Water Really Good?

The two tables above are a striking proof of the fine quality of Philadelphia's water. The tables show 18 different factors, in terms of which the water is measured as it leaves the treatment plants. They also show the **maximum permissible limits** allowed for these factors by the U.S. Public Health Service and the American Water Works Association. In all but a few instances, Philadelphia's drinking water falls well below these limits or does not exceed them. Where it exceeds them, the difference is almost always slight.

On-board Analyses: Equipped with an on-board laboratory (photo below), the department's new cabin cruiser allows sanitary engineers to study river water samples while afloat. Samples are drawn through the bottom of the boat, flowing out through laboratory faucets, or they are collected by brass container and bottle dropped overboard, as shown above.



Monitoring Unit: To watch the Delaware and Schuylkill Rivers, seven new monitoring units were installed along river banks between 1967 and 1969. Replacing older instruments, the new devices measure a variety of river conditions.



Monthly hardness averages fluctuated in 1968-69 from 6.6 to 14.3 grains per gallon in the Schuylkill, and from 2.6 to 7.3 grains in the Delaware.

Several oil spills by industries occurred in both rivers, but these had no effect on the city's water. The Water Department investigated these and other types of spill, as it had been doing for years. Because of such past efforts, the instances of dumping of industrial wastes were few. Detergents, which once promised trouble, were no longer a problem, since the introduction to the detergent market of bio-degradable types.

NEW TOOLS TO STUDY THE RIVERS

Much was still unknown about the Delaware and Schuylkill Rivers. For many years the Water Department and the U.S. Geological Survey had studied these streams jointly.

Together they had set up automatic monitors at six points on the Delaware River and one point on the Schuylkill. Operating 24 hours daily, these instruments recorded a variety of stream conditions.*

To improve their knowledge, the two agencies began to replace these instruments in 1967 with new "package" units of an advanced type. This replacement was completed in 1968.

Unlike the multiple devices previously located at the river stations, the new units were single devices capable of doing a number of jobs. They were able to measure up to eight different stream conditions (or parameters), and to digitize the resulting data on a tape that could be "translated" for use on a computer. In future years, because of the inherent adaptability of the new units, such information may be translated at the instrument and transmitted by it directly to a computer located at a distant point.

*Such as temperature, dissolved oxygen, "pH," specific conductivity, turbidity, etc.

To support this basic stream study, the Water Department took these further steps in 1968-69:

1. It replaced its river cruiser with a later model. Faster and better equipped, the new boat will make possible a wider collection of mid-stream water samples, and its spacious laboratory will permit more on-board testing. Such immediate testing will increase the accuracy of tests.

Costing $60,000, the new boat is 41 feet long and capable of speeds up to 19 knots. Though delivered by mid-1969, it had not been fully accepted. The department required the repair of an engine.

Water samples were collected from Marcus Hook to Trenton, almost weekly, during the 24 months. Because of mechanical troubles with the old boat and testing of the new, many samples were collected at shore points.

2. The department requested the Drexel Institute of Technology to make two studies: (1) To determine what effect oleiocheate worms (in the bed of the Delaware River) would have on stream oxygen, if oxygen-demanding wastes were further reduced, and (2) to learn the effects of incinerator wastes, used as landfill along the streams. Both studies were under way.

3. In agreement with the U.S. Geological Survey, the department laid plans for a "pollution warning" service. It was hoped that data collected from the stream monitors could be processed by computer and issued to Delaware Basin industries and public agencies whenever pollution spills occur. For this service, U.S.G.S. agreed to pay the city $14,000 a year. The service may be activated in 1970.

4. Research engineers studied the relationship between (1) stream conditions and treatment plant costs, and (2) future population and water use. The latter study was being done in cooperation with the Delaware River Basin Commission. Special scrutiny was also given to the assumptions underlying a "mathematical model" of the Delaware estuary, used by D.R.B.C. in setting new standards for stream improvement.

5. Five more depth-of-flow gauges were set up along creeks in Northeast Philadelphia in 1969. The data from these was correlated with that from 21 rain gauges scattered throughout the city. This formed part of a study of hydrology and stream flow characteristics. One purpose was to gain a better understanding of the pollution of creeks.

FACTS IN BRIEF

	1969	1968	1967	1958
POPULATION	2,002,512(a)	2,002,512(a)	2,002,512(a)	2,071,605(b)
WATER SYSTEM:				
Meters in system	524,263(c)	525,480(c)	526,331(c)	509,010(c)
Unmetered accounts	1,814(c)	2,146(c)	2,115(c)	11,296(c)
Total services	526,077(c)	527,626(c)	528,446(c)	520,306(c)
Consumption of filtered water				
• Per person on average day (gals.)	181.4	181.5	169.3	162.5
• Average day (million gals.)	362.9	363.5	339	336.6
• Maximum day (million gals.)	470.1(d)	535.4(e)	440.4	434.1
• Total annual (billion gals.)	132.5	133.1	123.7	122.9
Total annual raw water pumped (billion gals.)	139.1	140.3	130.4	132.6
Pipelines (miles)	3,214.7	3,210.2	3,202.5	2,968.2
Valves	75,612	74,993	74,105	64,262
Fire hydrants	25,419	25,486	25,422	24,289
WASTEWATER SYSTEM:				
Wastewater treated on average day (million gals.)	417.9	411.6	401	300.9
Total wastewater treated in year (billion gals.)	152.5	150.6	146.4	109.4
Sewers (miles)	2,526	2,510.6	2,491	2,284
HIGH PRESSURE FIRE SYSTEM:				
Pipelines (miles)	63.3	63.3	63.3	63.3
Valves	1,875	1,875	1,875	1,868
Fire hydrants	1,050	1,050	1,050	1,070

NOTE: (a) U.S. Census, 1960
(b) U.S. Census, 1950
(c) On December 31
(d) Monday, June 30, 1969—temperature 90 degrees F.
(e) Thursday, July 18, 1968—temperature 94 degrees F.

THE WASTEWATER SYSTEM

MILLIONS MORE FOR CLEAN STREAMS

For Philadelphians, a vital fact emerged in 1968. Although they had invested nearly $100 million* in stream protection, they would have to invest large additional sums.

For Plant Expansion: Spurred by predictions of future pollution (as population and industry grow), the Pennsylvania Sanitary Water Board** issued new orders to Pennsylvania communities. These orders limited severely the future wastes that might enter the estuary of the Delaware River.

The orders required Philadelphia to limit the "carbonaceous oxygen demand"*** of its wastewater effluent to 131,500 pounds daily. As a result, the city would have to remove from 88% to 92% of such demand from wastewater, compared with an overall average of 55% to 60% at present. Ultimately, removals would be even higher because of increasing population and industry.

If the new percentages could be attained, the city's effluent would be almost as clean as water for bathing.

Whether such cleanliness was necessary in an estuary used mainly for shipping . . . whether current technology would make it quickly attainable . . . whether it was justified by the costs — these were questions that troubled the city.

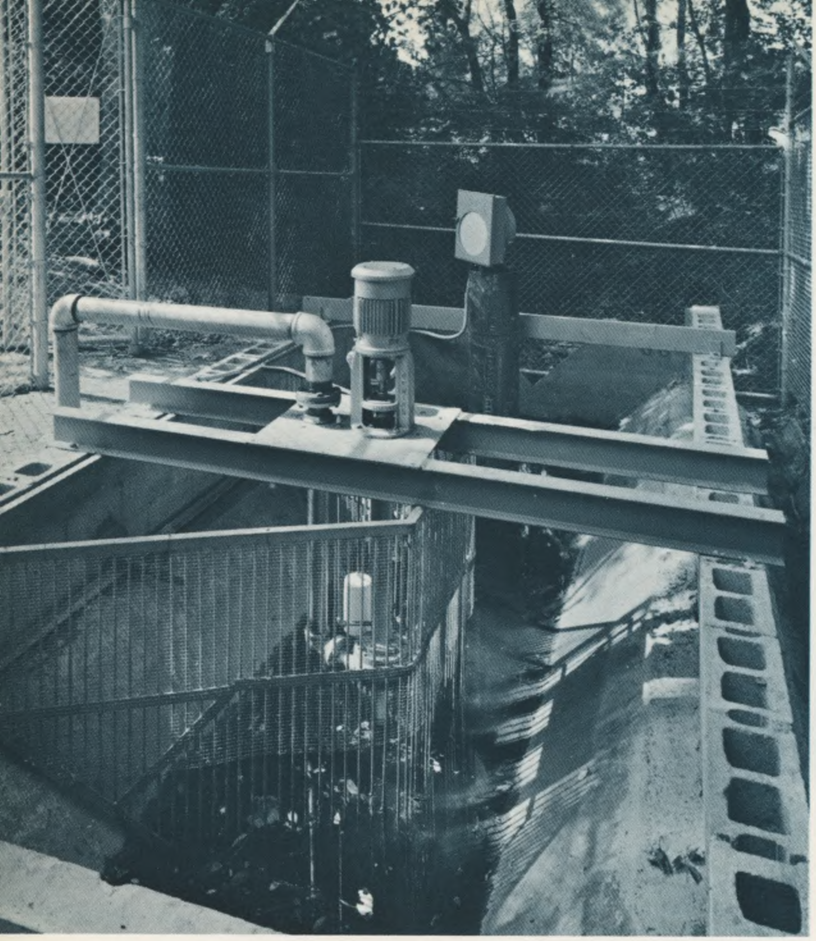
Of cost there was little doubt. To make its effluent "almost as clean as water for bathing" up to the year 1990, the city would have to spend $100 million for the *initial* expansion of its water pollution control plants, and amortization could raise this to $265 million. In addition, the city would have to spend $1.2 million yearly to disinfect its effluent. Total operating costs would rise by $9 million yearly.

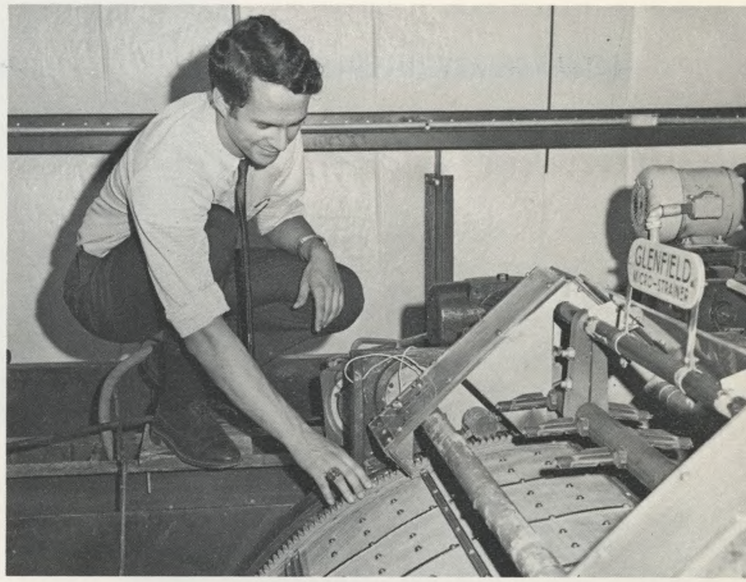
Desirous of further stream improvement, the Water Department proposed a more realistic, interim plan, which could be carried out without delay. It asked the Sanitary Water Board and the Delaware River Basin Commission for permission to convert its plants into activated sludge plants that would remove a yearly (rather than daily) average of 85% of carbonaceous oxygen demand.

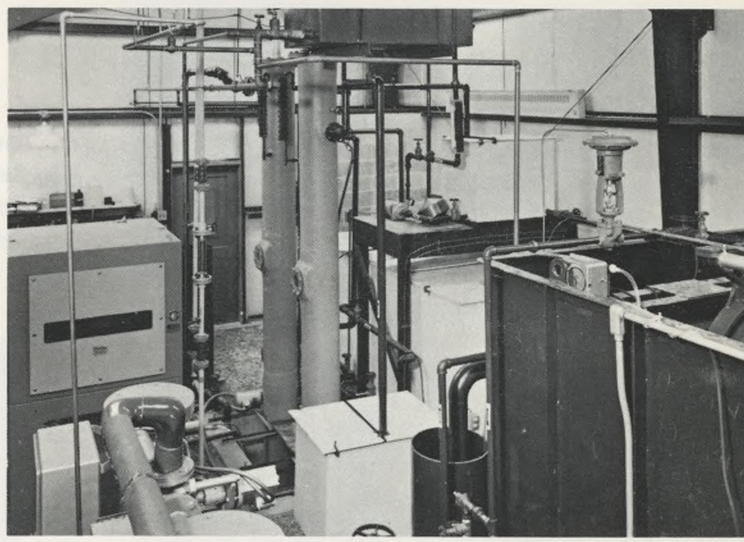
The department pointed out that this interim plan would have several advantages: Although the removal of oxygen demand would be only three to seven per cent less than the state envisions, the initial capital cost for plant expansion would be $35 million less, and amortization costs would also fall. Stream improvement would come more rapidly than under the state plan. Meanwhile there would be time for technology to catch up with the standards desired by the state, and the city, having achieved the first stage, could go on to the second stage when the need develops.

The differences between the state and city plans were partially resolved early in 1970. After careful consideration, the regulatory agencies gave the city permission to create activated sludge plants of very large capacity. When the new plants go into service,

*Capital funds (since 1946) for water pollution control plants, wastewater pumping stations, and interceptors. In addition, the city has spent over $200 million on tributary sewers.
**With the concurrence of the Delaware River Basin Commission, which had set slightly lower standards.
***A measure of pollution.







Study to Curb Pollution. Aided by a federal grant, the Water Department and a private firm studied new techniques for treating the storm water overflow that often reaches streams from sewers. Storm flow was pumped from a small catch basin (left) to a nearby shed where it was passed through a revolving microstrainer (below) and then treated with chlorine and ozone.

they will be large enough to limit the city's wastewater effluent to 131,500 pounds of carbonaceous oxygen demand daily. The cost of building the new facilities will be in excess of $80 million.

While awaiting plant expansion, the Water Department continued to make a number of lesser improvements to its wastewater system. In 1968-69, the value of such new improvements was $20.4 million.†

For Curbing of Storm Overflow: Philadelphia faced yet another cost for stream protection. This stemmed from its 1,200 miles of "combined" sewers — at least half of all its sewer mileage. Bearing sewage and storm water in the same pipeline, these sewers automatically discharged some flow into rivers during storms. This was to avoid flooding the treatment plants.

The city had long dismissed the idea of replacing this huge mileage with new pipelines that would separate sewage from storm water; the cost of replacement could reach $1.5 billion. Because the pollution was small, some less costly solution was needed.

Late in 1968, the Sanitary Water Board directed Philadelphia to report within one year the nature and quantity of pollution entering local streams during storms. It also asked the city to prepare a plan for curbing such pollution.

Faced with an all too short time period and the nonexistence on the market of proper devices for study of storm water overflow, the Water Department appealed the board's order, and this appeal is still pending.

Nevertheless, the department and a private firm (Glenfield and Kennedy, Inc.) had already begun an important study. Aided by a $200,000 federal grant, they were jointly screening and treating the waste-burdened storm flow of a sewer that empties into Indian Creek. Flow from a small catch basin (at 69th and Callowhill Streets) was pumped to a nearby shed. There the flow passed through a revolving steel microstrainer to remove sediment and other particles, and then the effluent was treated with chlorine and ozone. If this pilot study proves successful, microstraining

†Outlays in 1968-69 (based on partial and final estimates in the field) were $3 million for water pollution control projects, and $19.4 million for sewer jobs that included $2 million for water mains. Other statistics for the 24 months: 210 wastewater system contracts, with a limit of $24 million, were completed; 179 contracts, with a limit of $19.3 million, were awarded; 107 contracts, with a limit of $14.5 million, were in force on December 31, 1969.

(and/or chemical treatment) may be one answer to storm water overflow.

The Water Department planned to study still another possibility: This was the containment of storm flow inside large sewers until after storms, when it would be routed to treatment plants. This study awaited financing.

THE WASTEWATER PLANTS: STEPS TO IMPROVE TREATMENT

Despite the need for future expansion, Philadelphia's modern plants treated all of the city's wastewater, plus large quantities from neighboring communities.

The flow to the plants was greater, indeed, than ever before. During the 24 months, it averaged 414.8 million gallons daily. From the 303 billion gallons received, the plants removed 204,000 tons of suspended solids.

The plants also performed well when judged by a more technical standard — that of biochemical oxygen demand (B.O.D.) As a group, they removed 55% of B.O.D. yearly. These removals were much higher than those of most other communities along the Delaware River estuary. They were also about 5% better than the existing combined standard set by the Sanitary Water Board for the city's plants.

Nothwithstanding the city's over all performance, the Sanitary Water Board (in 1969) ordered an immediate increase of treatment at the Northeast Plant. There the board sought 75% removal of biochemical oxygen demand, without waiting for the future expansion which will make removals at that plant even higher.

Though designed to remove 75% of B.O.D., the Northeast Plant has not always attained this goal in recent years. A heavy inflow of industrial wastes has made treatment complex and difficult, and this industrial flow has been rising. In 1968, the plant removed 64.6% of B.O.D., and in 1969 about 66%.

To improve this removal, plant engineers strove for better biological treatment: Hoping to increase the growth of the aerobic bacteria that are used to decompose wastes, they experimented with varying combinations of aeration and return sludge in the aeration tanks.*

In mid-1969, the Water Department put into effect another plan that it had been studying. It installed new equipment to apply ferric chloride and a polyelectrolyte to the incoming industrial flow. These chemicals, it was anticipated, would help to reduce the B.O.D.

Because of past improvements, Philadelphia's other two plants did better than their design levels. Although designed to remove only 35% of biochemical oxygen demand, these plants took out from 41% to 48% during the 24 months. They also removed 56% to 62% of suspended solids, compared with a 50% design level.

At the Northeast Plant, the removal of suspended solids rose from 70% in 1968 to 75% in 1969.

Automation Studies: While chemicals and improved biology offered one prospect for upgrading the treatment of wastewater, the Water Department was also looking forward to automation. The control of treatment by computer could effect many operating efficiencies.

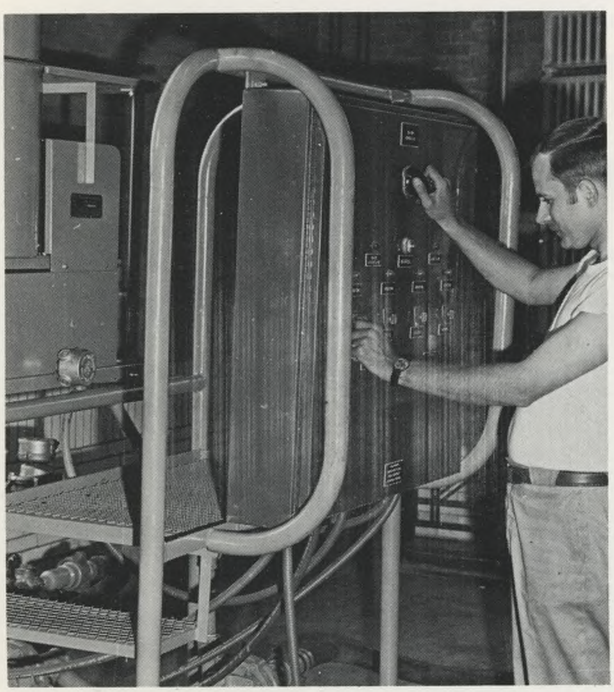
Such automation will be initiated at the Northeast Plant and then extended to the other plants. Following up a 1967 study, the department started to build a wing at the Northeast Plant in 1969 for a future computer center.

While laying these plans, engineers were developing the field instrumentation that will be required for computer control. Such instruments will "tell" the computer what is going on and carry out its orders. Several steps were taken in this direction:

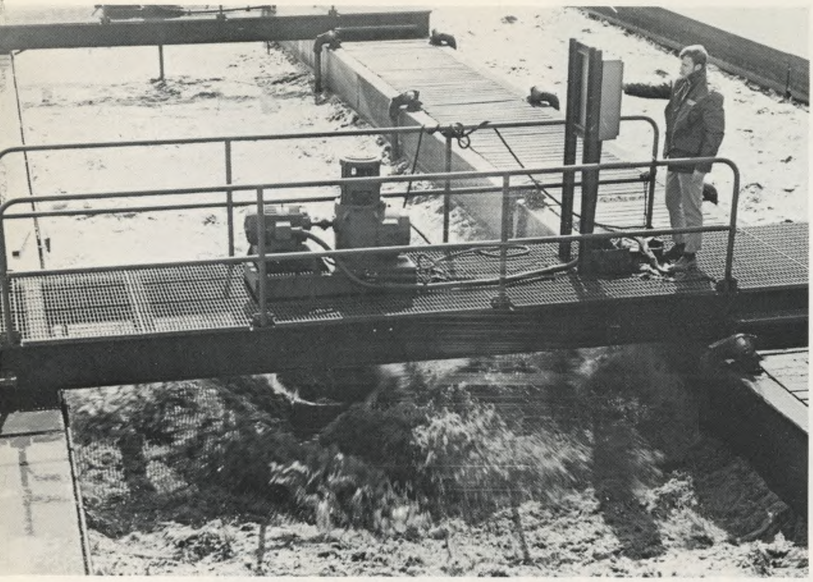
1. Two mechanical aerators were ready to go into service in an aeration basin at the Northeast Plant. Shaped like airplane propellers on long motor-driven shafts, the aerators will spin to create turbulence in the wastewater flow. The turbulence will trap air from the atmosphere, thus supplementing air fed by blowers to the wastes.

Automatic in operation, the aerators will be triggered by electrical probes connected to a device that will analyze continuously the dissolved oxygen in the flow. Cost: $93,500.

*Generally, the domestic and industrial flows were mixed and then resplit into two new flows. The latter were treated separately by modified aeration and contact stabilization. On occasion, step aeration was tried.



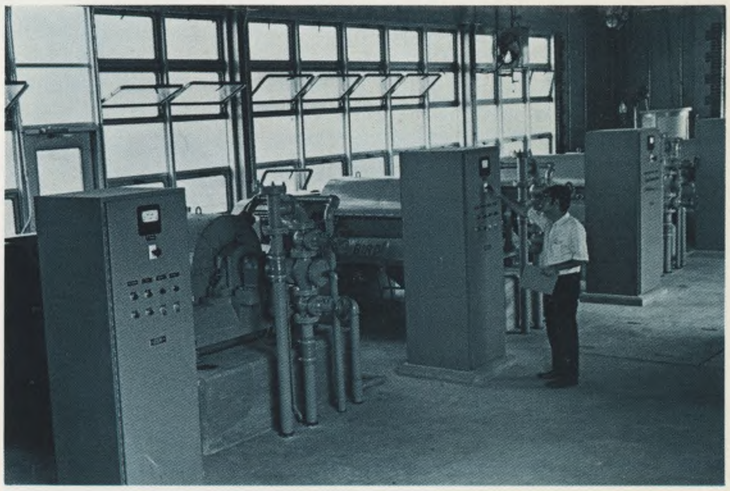
For Improved Treatment: To assure 75% removal of biochemical oxygen demand from wastewater at the Northeast Plant, chemicals were added to the flow in 1969. A polyelectrolyte was applied by this automated equipment.



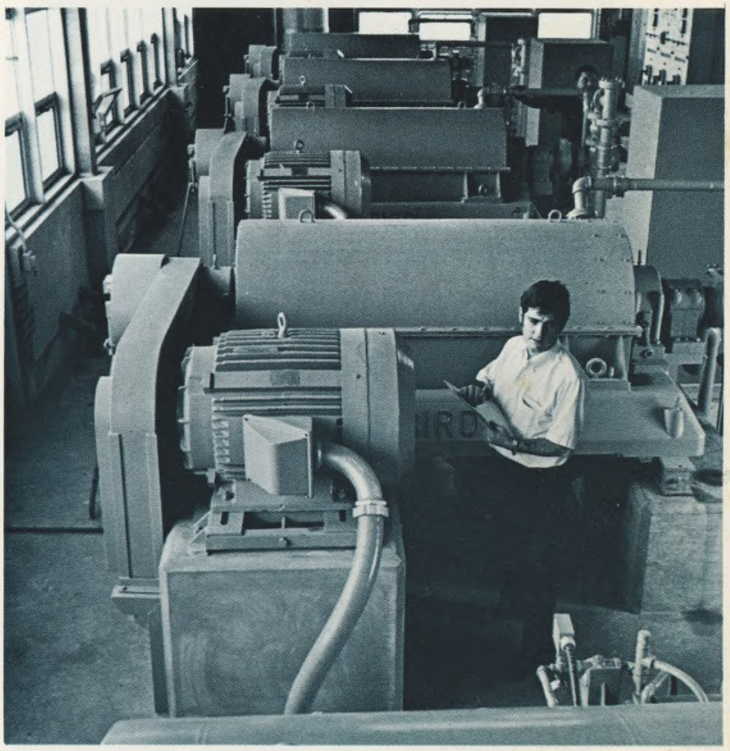
Aerator: Spinning at high speed, a new propeller-type aerator churns the wastewater flow at the Northeast Plant and the resulting turbulence traps air from the atmosphere. Two such aerators were installed at the plant to supplement air from blowers. Aeration aids treatment.

Sludge Processing: New equipment was also installed to improve the heating, digestion, and dewatering of the sludge which is removed from wastewater.

1. Thus at the Southwest Plant, two new heaters were installed. The heaters helped to maintain the favorable environment required by the anaerobic bacteria which digest (or decompose) the sludge in digester tanks. They also offered another benefit: No longer were gases and odors wafted to nearby areas in the summertime when the wind was blowing the wrong way. Of a "heat exchange" type, the heaters did not emit gases and odors.



For Dewatering Sludge: An $804,000 station was built at the Southwest Plant to remove some of the water from digested sludge. Five steel centrifuges (below) will whirl the sludge. Because digested sludge is barged to sea, a less watery sludge will save the city money.



2. To keep an automatic check on the future removal of biochemical oxygen demand, plant personnel were studying a "total carbon" analyzer. There appeared to be a "usable" relationship between B.O.D. and total carbon, and thus some form of the analyzer may be incorporated in future instrumentation.

3. Other automatic devices were also being studied. These included the monitoring of the turbidity and "pH" of the wastewater. At the Southwest Plant, the removal of sludge from the primary settling tanks was controlled by density gauges.

THE WASTEWATER PLANTS: NEW CONSTRUCTION

With expansion still in the future, the Water Department made many lesser improvements to its water pollution control plants. For this purpose, it did $2.8 million of work under 88 contracts during the 24 months. These contracts had a limit of $6.9 million.

Most of the new facilities were erected to improve the treatment or handling of wastewater.

Aeration: With the completion of an electrical substation, two new air blowers went into service at the Northeast Plant in June, 1968. The blowers supplied air to a large tank — the home of billions of aerobic bacteria which feed on the sewage. Helping the bacteria oxidize the wastes, the blowers boosted the efficiency of treatment.

Although the blowers had been ready for three years, the materials shortages caused by the Viet Nam War had delayed completion of the vital sub-station. Their combined capacity — 36,000 cubic feet per minute — raised the total air supply of the plant to 85,000 C.F.M.

In the winter, the new heaters supplemented existing heaters, providing the fuller capacity required in cold weather. Costing (with the wing in which they were housed) $171,000, they added 10 million B.T.U.'s to the previous 27.6 million B.T.U.'s of capacity.

2. With the aid of new compressors, bacteria-produced gas was being circulated through the sludge in several digester tanks at the Northeast and Southwest Plants. The gas caused the sludge to turn over, thus preventing the build-up of hardened deposits; in past years such deposits had reduced the capacity of the tanks.

The recirculation systems, which included piping and remote controls, were being installed in 15 tanks, under contracts totaling $722,000. By mid-1969, the systems were completed in five tanks. A sixteenth tank had been adapted under an earlier contract.

3. A small centrifuge station offered some monetary savings at the Southwest Plant. This station, which was almost finished, will partially dewater digested sludge, which is the residue of wastewater treatment.

To remove more of the water from such sludge was becoming increasingly necessary. This was because the plant lagoons were full, and the city had to barge most of its sludge to sea.

During the 24 months, a private contractor carried 206 million gallons of sludge to the Atlantic Ocean. Costing the city more than $3 per thousand gallons,* the barging required 228 trips. Unhappily, most of this sludge was water. Though the solid content at the Northeast Plant averaged 10% to 12%, that at the Southwest was only 6% or 7%. The new centrifuge station will raise the solid content at Southwest to 12%, thus permitting the sending of more solids to sea on fewer trips.

An airy, well lighted, brick edifice, the new station measures 74 ft. x 32 ft. It houses five steel centrifuges that will whirl the sludge at speeds up to 2,400 R.P.M., to separate some of the water. This process will be aided by a polyelectrolyte chemical, which will condition the sludge.

Within the station are 10 sludge pumps, as well as pumps, tanks and mixers for chemicals. At the end of 1969, only electrical work and final testing were still to be done at the $804,000 station.

Other Construction: New equipment buildings were erected at the Southeast and Southwest Plants, under contracts totaling $305,000. These small brick structures will house portable equipment used in maintenance and will offer space for repairs. That at the Southwest Plant will also have offices.

Much minor work was done at all the plants. This included the replacement of (1) four pumps in digester tanks at Northeast, (2) chains, sprockets and collectors in the primary settling tanks at Southeast, and (3) some bar-screen cleaning equipment at Southeast and Southwest. Installation of a new pump, of 20 million gallons daily capacity, was completed in the wastewater pumping station at the Southwest Plant.

A new tourist attraction, Fort Mifflin, had its own miniature plant for wastewater treatment. The tiny plant went into manual operation in June, 1969. The $63,000 unit, installed by the Water Department, consists of an underground tank, where wastes are oxidized by aerobic bacteria. The wastewater reaches the tank by well hole and pump. Automatic controls will be installed for the unit in 1970.

Future Construction: To burn grease and oil skimmed from sewage, the Water Department plans to build small incinerators at its plants.

In the summer of 1969, construction started on a $224,000 hearth-type incinerator at the Northeast Plant. This will be fueled in part by natural or sewage gas and will be capable of burning up to 600 lbs. of grease and oil per hour. Of a type permitted by the city's air management code, the incinerator will be odorless and will emit almost no particulate matter to the atmosphere.

Incinerators will greatly reduce the clogging of plant pipelines, the malfunctioning of digester tanks, and the odors in disposal areas, caused by grease and oil.

NEW STATIONS TO PUMP WASTEWATER

Three small stations began to pump wastewater early in 1969. The stations picked up flow from hundreds of homes in Northeast Philadelphia and pumped it to the Northeast Plant for treatment.

Built at a cost of $317,000, the stations had a combined capacity of 3,400 gallons a minute. Located underground, they were completely automatic.

Pumps were actuated by the rise or fall of flow through the stations, while operations were monitored by control panels that transmitted signals to the Northeast Plant. From the latter, personnel could be quickly dispatched to correct malfunctions. Equipped with non-clogging pumps, the stations also had ventilating systems to remove gases, and mechanisms to cut and screen coarse material in the wastewater.

The largest of the stations was located at Linden Avenue and Milnor Street. This facility — 33 feet deep, 17 feet wide and 33 feet long — received wastewater from an area along the Delaware River, running generally north of Linden Avenue, east of State Road, and south of Convent Avenue. With a pumping capacity of 1,400 gallons per minute, the Linden Avenue Station was built at a cost of $167,000.

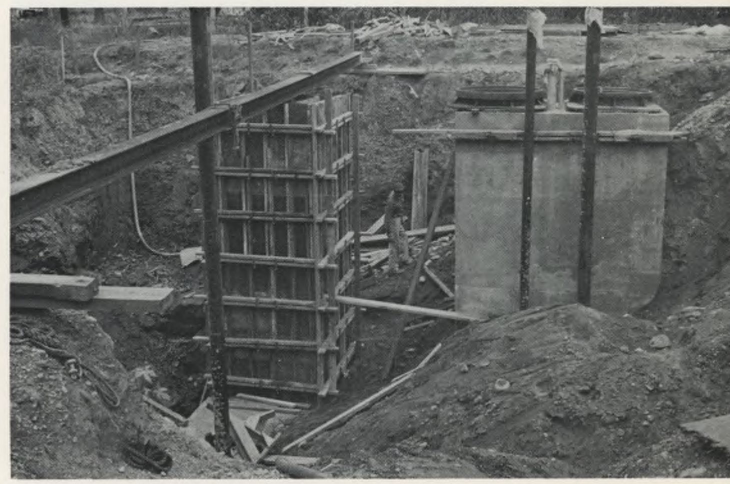
Thanks to this station and new sewers built under other contracts, many old homes received city sewer service for the first time.

The other two stations were to service *new* homes, recently built or planned, in a triangular area bounded by the Montgomery County line, Woodhaven Road

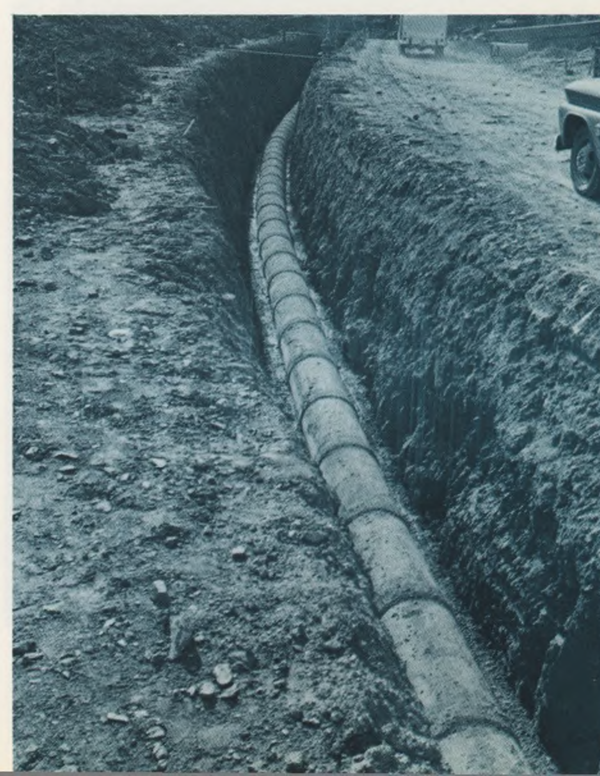
*$3.73 per thousand gallons up to September 22, 1968, and $3.17 after that date as the result of a new contract.

For Maintenance: Small buildings were erected at the Southeast and Southwest Plants to store portable equipment and to provide maintenance workshops. Photograph shows building at Southeast Plant.

Laboratory Tests: To assure sound treatment, wastewater is sampled and tested at every stage as it flows through the water pollution control plants. In the two-year period, 1968-69, the plant laboratories made 400,000 tests on 100,000 wastewater samples.



Underground Station: Sunk 33 feet into the ground, a new station was constructed on Linden Avenue (near the Delaware River) to pump wastewater from neighboring homes to the Northeast Plant for treatment. The station is automatic.



Sewers for New Neighborhoods: Twenty-six miles of sewers were laid to service new homes and industries. Typical was this line in Somerton, which will collect wastewater from 30 new homes.

and Audubon Avenue. Several hundred additional homes will go into this area.

The stations included the "Lockart", northwest of Lockart Road near Ridgeway Street, with a capacity of 1,200 gallons per minute ($105,000), and the "Rennard", between Rennard Street and Tomlinson Road near the Montgomery County line, with a capacity of 800 G.P.M. ($45,000). The cost of connecting sewers for these stations and the one on Linden Avenue was $1.2 million.

The new facilities brought to 14 the number of stations pumping sanitary flow throughout the city. These had a combined capacity of more than one billion gallons daily. Little except maintenance was done in the older stations, but at the big Central Schuylkill Station new bar-screen cleaning equipment was installed.

52 MORE MILES OF SEWERS

More pressing than ever was the need for sewers. The growth of new neighborhoods, the wearing out of pipelines, and the steady rise in wastewater flow, were imposing new demands on the city.

To meet this need, Philadelphia had built 637 miles of sewers since 1953, and by the end of 1969 its sewer network had grown to 2,526 miles.

The mileage built in 1968, indeed, was the greatest in four years. The Water Department laid 30 miles of sanitary and small storm sewers, and it added another 22 miles in 1969.

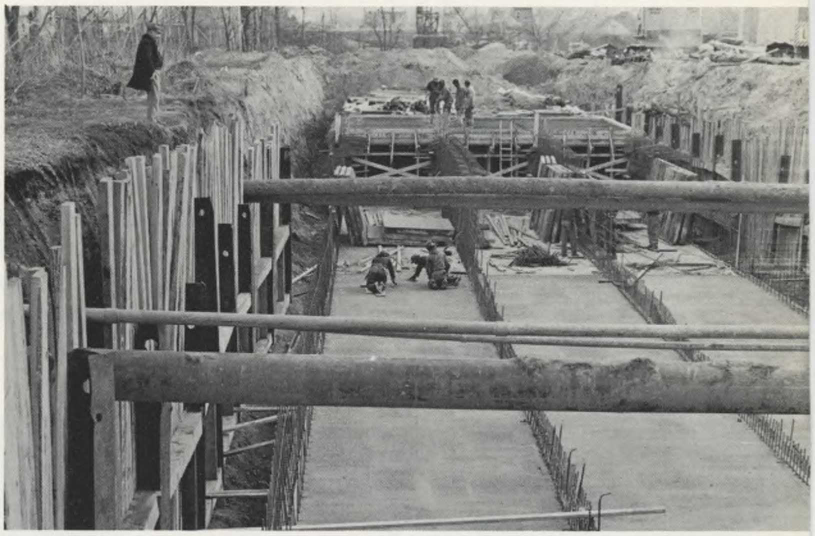
Sewers for Replacement: One heavy expenditure was for sewer replacement. The department spent $7.2 million in 1968-69 to reconstruct over 16 miles of old sewers.

There was need for attention to old sewers. Of the 1,200 miles of sewers constructed by the city up to 1910, over 1,000 miles were still in service. With each passing year, the old sewers were steadily deteriorating and the danger of collapse, in some instances, was growing.

To avert imminent collapse, the Water Department ripped out an old brick sewer in Belfield Avenue, extending for 850 feet from Wagner Avenue to 18th Street, and replaced it with a new reinforced concrete oval line. Collecting sanitary and storm water flow from much of eastern Germantown, the new sewer went into service in February, 1969. Its huge size — 15 ft. x 17 ft. — gave it greater capacity than the old sewer. The cost of replacement was $600,000.

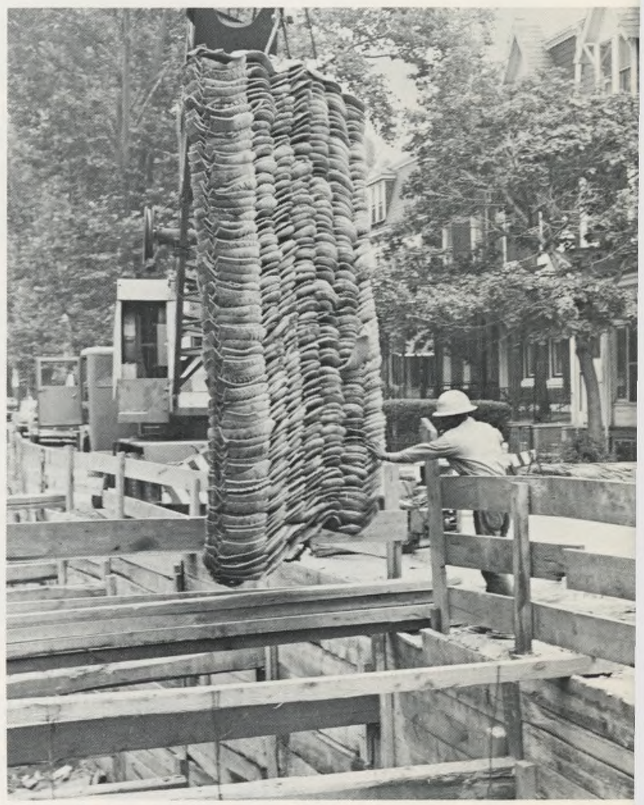
Replacements were made in all parts of the city. Of special note were sewers in Chelten Avenue from Greene Street to Wayne Avenue ($56,000); in Spruce Street from 24th Street to the Schuylkill River, and in 24th between Spruce and Delancey Streets ($124,000); in Powelton Avenue between 42nd and Market Streets ($185,000); and in several streets centering on Grays Ferry Avenue and Ellsworth Street ($196,000).

Sewers for Eastwick: Over 11 miles of sewers were built in Eastwick, an area which is being redeveloped in Southwest Philadelphia. The sewers included triple conduits (above and below) of reinforced concrete to pick up storm water or wastes.



Sewer Replacement: To improve the collection of wastes and storm water from eastern Germantown, a large concrete sewer was built in Belfield Avenue (below). The line replaced an old brick sewer that had greatly deteriorated.

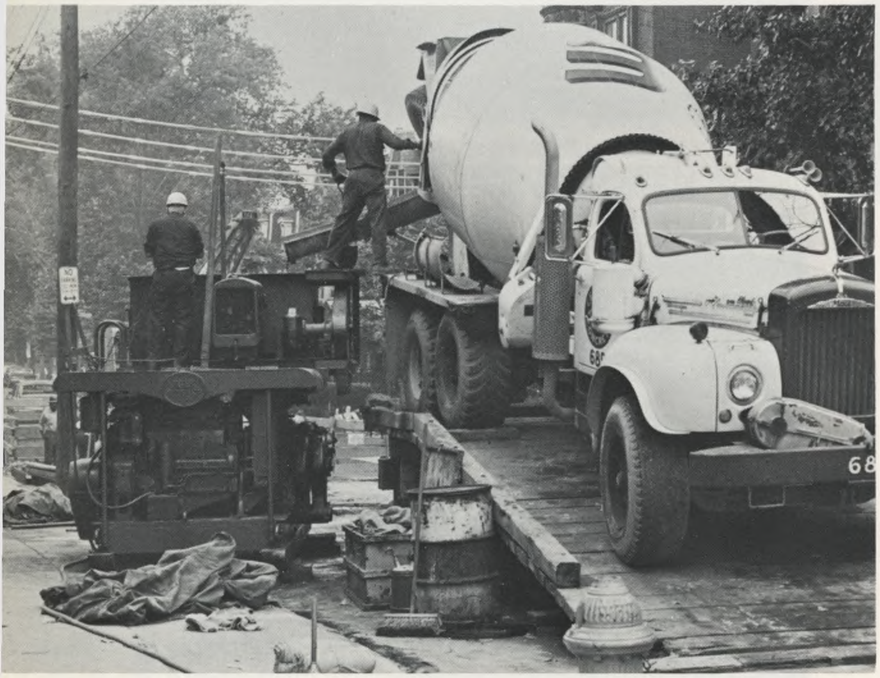
Final Stage: The most recent segment of the Main Relief Sewer went into service late in 1969. A 10-ft. concrete tube in tunnel, it extends along Sedgley Avenue and 16th Street and was built at a cost of $1.7 million.



A New Use for Old Tires: At the point where the completed tunnel is being tied into tributary sewers, a tire blanket is lowered to deaden the effects of blasting. Truck at left holds concrete for the job.

A TUNNEL SEWER REDUCES FLOODING

After 10 years of building, the city had completed two miles of tunnel extensions to the big Main Relief Sewer, which collects storm water from North Central Philadelphia. The total cost of the extensions was $5.1 million.

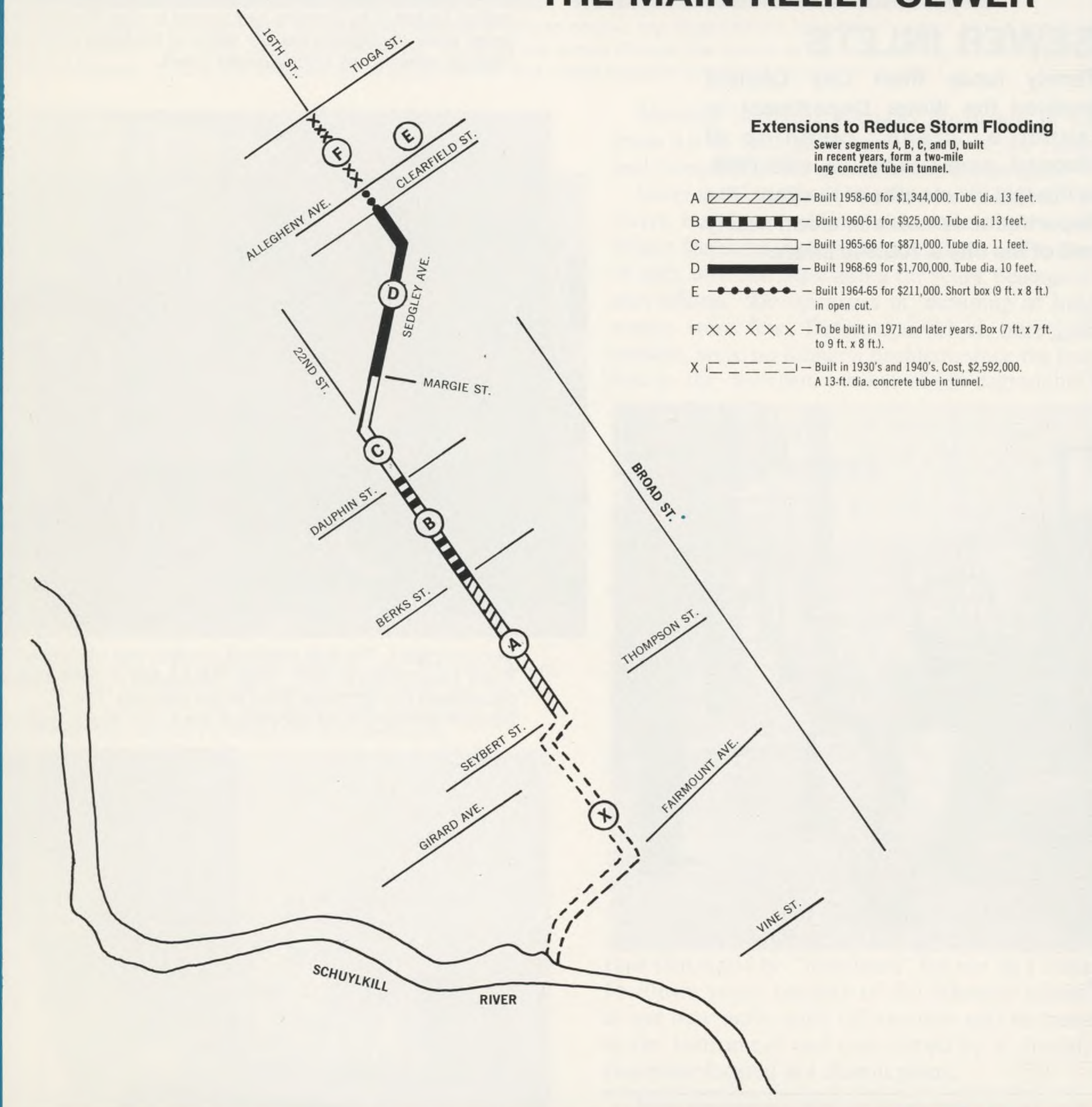


Sewers for New Neighborhoods: Twenty-six miles of sewers were laid to service new homes and industries. These included 11.2 miles in Eastwick, the new "city within a city" in Southwest Philadelphia. There the department built storm water conduits up to 7 ft. x 10 ft. in size, as well as many sanitary pipelines, in Norwitch Drive, Island Avenue, Essington Avenue, Lindbergh Boulevard, and other thoroughfares.

In Northeast Philadelphia — another area of rapid expansion — contractors built 5,800 feet of sewers in Pine Road and neighboring locations ($198,000), 8,100 feet in the vicinity of Lockart Road ($244,000), and 750 feet in Somerton ($49,000). These and other sewers were to serve hundreds of new homes and several industrial parks. The cost of such sewers laid throughout the city in 1968-69 was $7.6 million.

Sewers for Relief of Insanitary Conditions: To bring sewer service for the first time to many older homes, the department built 5.5 miles of sewers. These included more than a mile of pipeline in State Road from Linden Avenue to Arendell Street, and in neighboring locations ($273,000). Some homes at Bells Mill Road and Ridge Avenue were tied into a new sanitary sewer, laid for 3,000 feet along Bells Mill

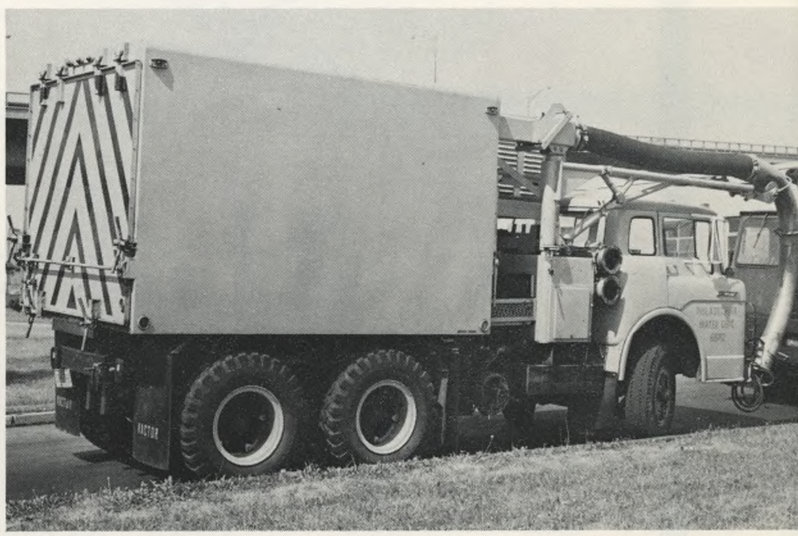
THE MAIN RELIEF SEWER



A Mammoth Problem: Debris washed in by rains and beer bottles tossed in by humans had helped to clog thousands of sewer inlets throughout the city. Many of the inlets had to be cleaned manually by hard pressed crews.

SEWER INLETS

Timely funds from City Council enabled the Water Department to launch a "crash" clean-up of clogged sewer inlets in mid-1969. In the last six months of the year, the department was able to clean nearly half of the city's 100,000 inlets.



Mechanization: The inlet cleaning function was transferred to the Water Department in April, 1968. Fresh funds in 1969 enabled the department to mechanize more of the cleaning. The vacuum-principle truck above was one of the new acquisitions.

Road, from Lykens Lane to a northeasterly point ($190,000). A later contract will link this sewer to additional homes to be built in the area.

Sewers by Other Agencies: A few sewers were built by other municipal departments, as part of larger improvements. Thus the City Department of Commerce laid sewers to serve the new Penn's Landing development, while the Department of Streets built sewers as part of the repaving of Delaware Avenue from Packer Avenue to a point 2,000 feet south, and then eastward on Packer Avenue. The cost of these contracts was $870,000.

TUNNELS TO RELIEVE STORM FLOODING

The reduction of storm flooding was a vital part of sewer construction. There were large areas of the city where older sewers, built for an age long past, could not readily carry off all the storm water from the many paved surfaces.

Because of this, Philadelphia had invested $28 million up to 1967 in large "relief" sewers. This program was independent of the many small storm sewers built as part of normal services.

Main Relief Sewer: To the many tunnel sewers built in recent years, the city added another. It extended the big Main Relief Sewer, in North Central Philadelphia, for seven-tenths of a mile.

The new tunnel was dug beneath Sedgley Avenue, from Margie Street to 17th Street, and then it was carried under the Spring Garden Institute to 16th Street, where it turned north to Clearfield Street. A concrete tube, 10 feet in diameter, was formed inside the tunnel, and the new line went into service in November, 1969.

Costing $1.7 million, the new extension was the last in a series of segments added to the Main Relief Sewer since 1959. The earlier segments, running for one and one-quarter miles, were constructed under contracts totaling $3.4 million. Picking up storm water from large areas west of Broad Street, the sewer empties into the Schuylkill River below Fairmount Dam.

Wakeling Street Relief Sewer: There was more relief in sight for residents of the Northeast. Aided by a grant from the Federal Government, the Water Department planned to extend the Wakeling Street Relief Sewer for another mile. This two-mile tube was originally built in 1963.

The extension — an 8½ ft. to 10¼ ft. concrete tube in tunnel — will run under Levick Street from Cranford Street to Bustleton Avenue, and in Bustleton Avenue between Levick and Benner Streets. Of its $2.4 million cost, the Federal Government will pay $1,169,500. Work started late in 1969.

SEWER SYSTEM MAINTENANCE

To keep the city's sewers flowing, the maintenance crews were busier than ever. Working in all kinds of weather — facing odors, gases, dirt, snow, and storm-swollen flows — they performed more than 48,000 jobs. The annual job rate was considerably higher than in many years.

Much of this work was preventive. To avert future sewer collapses, the crews inspected 160 miles of branch sewers and 77 miles of main sewers. Crawling or trudging through most of this mileage, they also inspected an increasing part of it by television camera. More than nine miles of sewers were singled out for replacement.

The cleaning of sewers was more extensive than ever before. During the two years, 68 miles of sewers were flushed, scooped out, or rodded, compared with only a few miles annually in preceding years. Most of this increase resulted from the use of a high-pressure

WATER DEPARTMENT MODERNIZATION 1946-1975

WATER SYSTEM	Encumbered—Expended Jan. 1, 1946-June 30, 1969	Scheduled July 1, 1969-Dec. 31, 1975*
Load Control Center	$ 1,291,192	$ 176,847
Torresdale Plant	25,967,660	342,281
Queen Lane Plant	12,991,933	2,937,040
Belmont Plant	12,042,730	2,230,946
Water Pumping Stations	14,302,814	2,573,934
Water Mains — Built, Replaced, Cleaned, Lined	86,739,140	32,545,302
Filtered Water Storage	12,797,936	1,736,351
Universal Metering	4,788,064	—0—
Miscellaneous	4,777,853	—0—
High Pressure Fire System	5,167,369	3,543,299
Water System Capital Improvements	**$180,866,691**	**$46,086,000**

WASTEWATER SYSTEM	Encumbered—Expended Jan. 1, 1946-June 30, 1969	Scheduled July 1, 1969-Dec. 31, 1975*
Northeast Water Pollution Control Plant	$ 17,650,324	$ 3,729,248
Southeast Water Pollution Control Plant	6,739,944	321,478
Southwest Water Pollution Control Plant	11,053,400	—0—
Wastewater Pumping Stations	2,615,594	71,652
Interceptors	54,751,062	5,564,498
Sewers — Built, Replaced	168,300,234	56,688,139
Miscellaneous	4,504,659	215,985
Storm Flood Relief	28,159,076	1,648,000
Wastewater System Capital Improvements	**$293,774,293**	**$68,239,000**

*There was no 1969 Capital Budget as such; the 1970 budget became operative on July 1, 1969. Thus, the 1975 Capital Budget period ends on December 31, 1975.

cleaner that shot a powerful water jet through sewer lines.

The crews also repaired or examined 31,000 sewer inlets; cleaned 57 acres of streams and drainage rights-of-way; dug up rat burrows for the Health Department; dye-tested numerous sewer laterals; and replaced lengths of pipe up to 45 feet, in 99 sewers.

A New Function — Inlet Cleaning: To its normal job of repairing sewer inlets, the Water Department added another on April 1, 1968. On that date, the duty of *cleaning* Philadelphia's 100,000 sewer inlets was transferred from the Department of Streets to the Water Department.

The new task was formidable. Because of a shortage of funds for inlet cleaning in recent years, nearly half of the city's inlets were partially or wholly clogged. This shortage of funds persisted in 1968, and, to a lesser degree, in 1969.

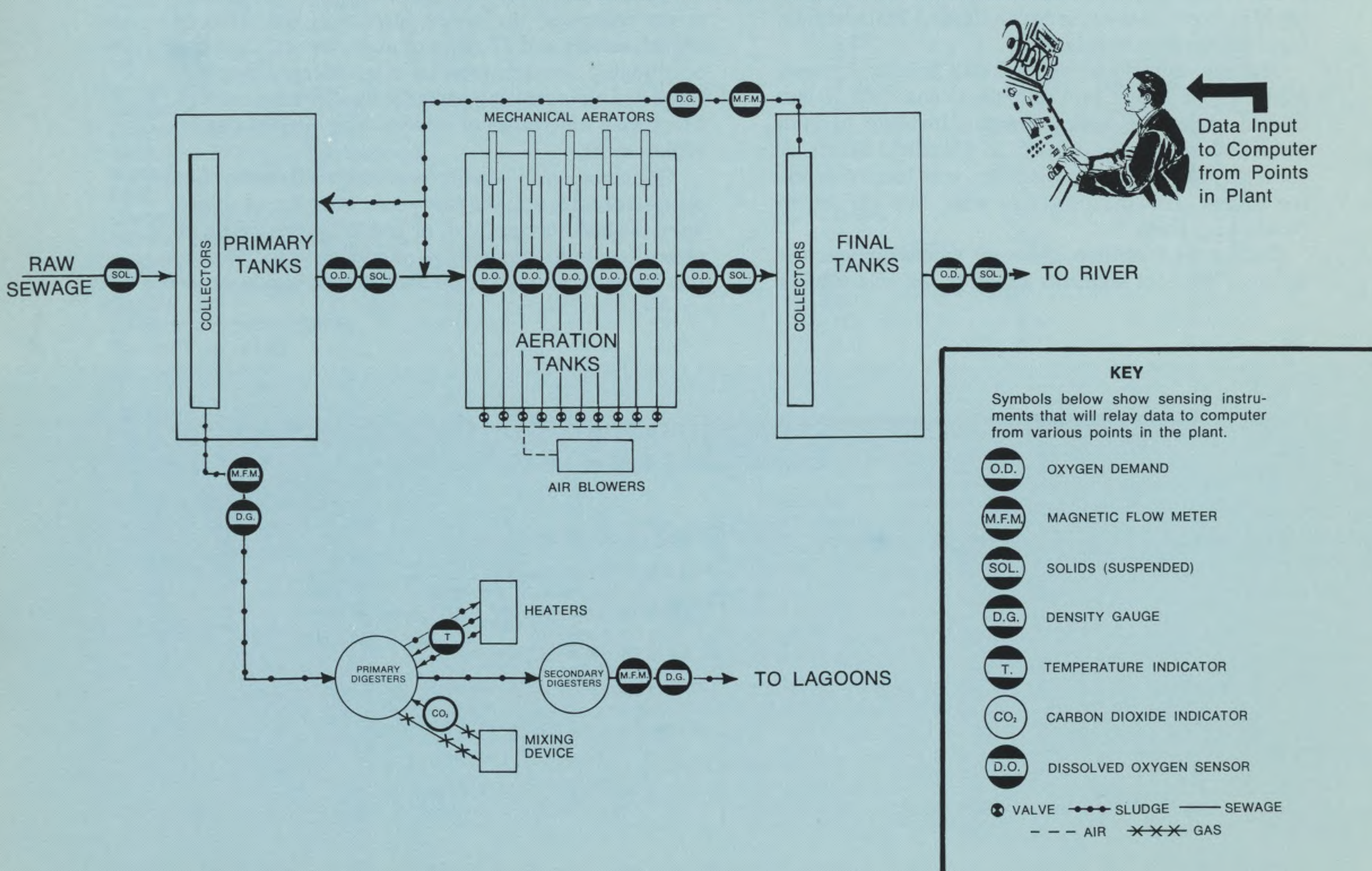
Able to muster only 36 permanent employees and plagued by a shortage of equipment, the Water Department cleaned only 22,000 inlets up to June 30, 1969, while the backlog of uncleaned inlets remained almost static. Fresh rains, blowing leaves, and debris tossed by humans, caused additional clogging.

The cleaning rate rose in March, 1969, when some temporary employees were hired under a "concentrated employment program", financed by the Federal Government. Turnover of such employees was so high, however, that the 43 initially hired quickly dropped to 21.

Recognizing the urgency of inlet cleaning, the City Council appropriated $300,000 extra in June for a "crash" program. Thanks in part to this money, the Water Department was able to clean 47,000 inlets in the second half of 1969, while the backlog of dirty inlets reported by the public dropped from 17,000 to 1,600. To spur this work, the department hired 100 additional temporary and eight permanent employees. It also rented 20 vehicles, and purchased four "combination" cleaning units with hydraulic crane.

Reorganization: To achieve better coordination, the supervisors of the inlet cleaning, sewer maintenance, and drainage information units were made responsible to a new official on September 1, 1968. With the title of "chief of the collector system", the new official reported in turn to the deputy commissioner for water pollution control.

SIMPLIFIED INSTRUMENTATION PLAN FOR FUTURE AUTOMATION OF THE NORTHEAST PLANT



THE CONTROL OF INDUSTRIAL WASTES

To reduce the flow of harmful industrial wastes, the Water Department worked closely with private industry. Visiting factories, restaurants, and other establishments, the department's representatives offered expert advice on how to recapture or neutrailze wastes.

Partly as the result of 20 years of effort by the city, many private firms were already bottling up or otherwise treating their wastes. This provided much protection for the city sewers and the nearby rivers.

To increase this protection, sanitary engineers made 1,400 inspections of treatment devices during 1968-69. These devices were located in both industrial and commercial firms. They also reviewed 1,200 plumbing plans to determine whether waste interception devices were needed. There were numerous consultations with private engineers and architects, who were planning such installations.

WATER POLLUTION CONTROL PLANTS: OPERATING DATA

	1968				1969			
	Northeast	Southeast	Southwest	Total	Northeast	Southeast	Southwest	Total
POPULATION EQUIVALENT*	1,862,000	936,600	908,600	3,707,200	1,924,091	1,010,000	905,425	3,839,516
Wastewater Flow (in millions of gallons daily)								
Rated Plant Capacity	175	136	136	447	175	136	136	447
Total Flow Treated	160.15	120.07	131.35	411.57	164.49	121.18	132.24	417.91
Flow from Other Communities	9.49	1.99	22.17	33.65	11.18	2.06	22.15	35.39
Solids in Wastewater (in parts per million)				Weighted Average				Weighted Average
Raw Suspended Solids	269	179	241	234	316	181	251	256
Final Suspended Solids	81	75	93	83	78	79	96	84
Total Solids Removed	188	104	148	151	238	102	155	172
% Solids Removed	69.9 %	58.1%	61.4 %	64.5 %	75 %	56 %	62 %	67 %
Tons of Solids Removed Daily	125.6	52.1	81.1	258.8	163	52	85	300
Biochemical Oxygen Demand in Wastewater (in parts per million)				Weighted Average				Weighted Average
Raw Water	237	159	141	184	232	166	138	183
Final Effluent	84	89	73	82	78	98	72	82
Total B.O.D. Removed	153	70	68	102	154	68	66	101
% of B.O.D. Removed	64.6 %	44%	48.2 %	55.4 %	66 %	41 %	48 %	55 %
Gas Production								
Millions of Cubic Feet Daily	0.7934	—	1.2998		1.2342	—	1.1906	
Cubic Feet Per Lb. Volatile	6.43	—	6.98		7.4	—	7.0	
Plant Treatment Costs (per million gallons treated)								
Electric Power Only	$ 1.28	$1.22	$ 2.44		$ 1.19	$1.14	$ 2.16	
All Direct Operating Costs	$32.90	$8.86	$19.51		$31.43	$9.82	$20.85	

	1964	1965	1966	1967	1968	1969
NORTHEAST:						
Wastewater Flow—Millions of Gallons Daily	141	149	153	162.8	160.15	164.49
Suspended Solids—% Removed	71	78	76	71.7	69.9	75
Biochemical Oxygen Demand—% Removed	68	74	70	67.7	64.6	66
SOUTHEAST:						
Wastewater Flow—Millions of Gallons Daily	101	107	110	114.7	120.07	121.18
Suspended Solids—% Removed	55	56	59	58.4	58.1	56
Biochemical Oxygen Demand—% Removed	44	45	46	46.4	44	41
SOUTHWEST:						
Wastewater Flow—Millions of Gallons Daily	123	129	120	123.5	131.35	132.24
Suspended Solids—% Removed	54	55	61	57.4	61.4	62
Biochemical Oxygen Demand—% Removed	31	39	48	45.8	48.2	48

*"Population equivalent" is not actual population. It is a technical measure of sewage strength. It is figured as 0.167 lb. of B.O.D. per person daily. In this way, industrial wastes, which are stronger than domestic sewage, can be measured in human terms.


PSFS

MANAGEMENT AND ENGINEERING SERVICES

TOWARD NEW MACHINES AND SYSTEMS

Savings in time, money, and labor were an important goal of Water Department management. It hoped to achieve this goal, in the future as in the past, through new machines and systems.

Engineering Computer Center: Nowhere was the department closer to success than in the Engineering Computer Center. There a new IBM 1130 digital computer went into service in January, 1968. Replacing an old 1620 model, the new computer was eight times faster, and it was the first expanded version of the 1130 to be installed on the East Coast.

From the outset, new uses were found for the computer, and its operating time rose monthly — from 43 hours in January to 132 hours in December. As new programs were developed, use of the computer became more efficient, and set-up time fell from 70% of total time in January to 21% in December. This efficiency was maintained in 1969.

While solving many complex engineering problems, the computer handled an increasing number of reports for operating units. The need to process large volumes of operating data (including data formerly stored) appeared to be growing. The computer was also used for design solutions, time-and-cost studies, and stream research.

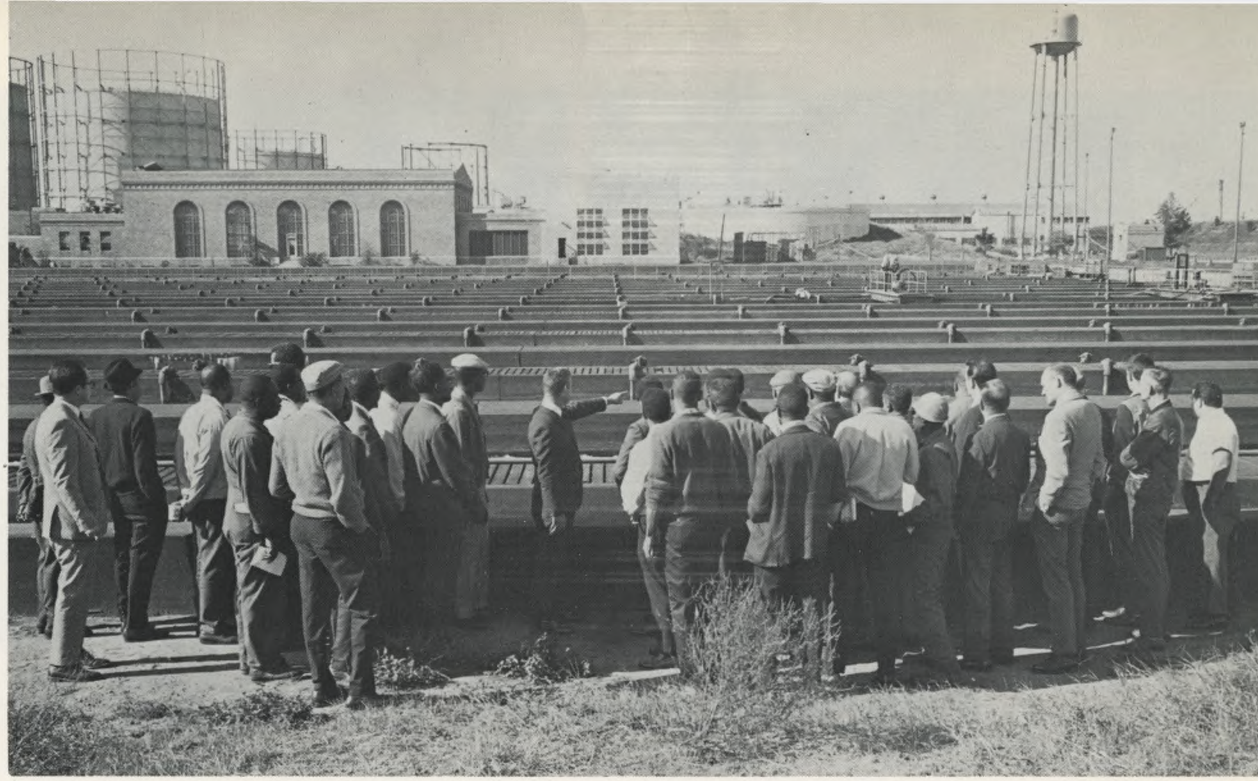
Although operated by the Water Department, the computer was available to all municipal agencies. Center personnel visited these agencies to explain possible uses of the machine and to help beginners prepare programs. To meet developing needs, the 1130 may by replaced in the future with a still more flexible unit — rented like past computers because of a fast changing technology.

Management Studies: Some maintenance costs were slashed by $240,000 in 1968-69, as a result of a new control system. The system was devised by a private consultant (H. B. Maynard and Company), hired by the Water Department.

To increase the efficiency of field crews in the Water Distribution and Sewer Maintenance Sections, the consultant studied crew sizes, uses, assembly points, travel time and costs. As a result, new job standards were recommended for Water Distribution and Sewer Maintenance.

The new system is expected to improve methods, organization, and planning techniques. It will also keep management posted by computer on the scheduling, routing and performance of maintenance. Future savings, it is estimated, will exceed $400,000 a year.

The consultant also reviewed the incentive pay plan for workers in the Meter Repair Shop, and presented revised standards to the Civil Service Commission in 1969. The Water Department's own small staff of analysts worked closely with the consultant in the various studies.



"Pilot" Program for Nation: A training course for 40 sewage plant operators from Southeastern Pennsylvania was started at the Northeast Plant. The federally-financed course was intended by the Federal Government to be a "pilot" for similar courses throughout the country. It combined practical instruction (above) with classroom instruction (below).

THE IMPROVEMENT OF PERSONNEL

Management sought efficiency is still another way in 1968-69. It continued to train its employees in newer and more sophisticated technologies.

There was need for such training. The new plants and services were requiring increasing knowledge from those who staff them, and this need will grow with future plant expansion and automation.

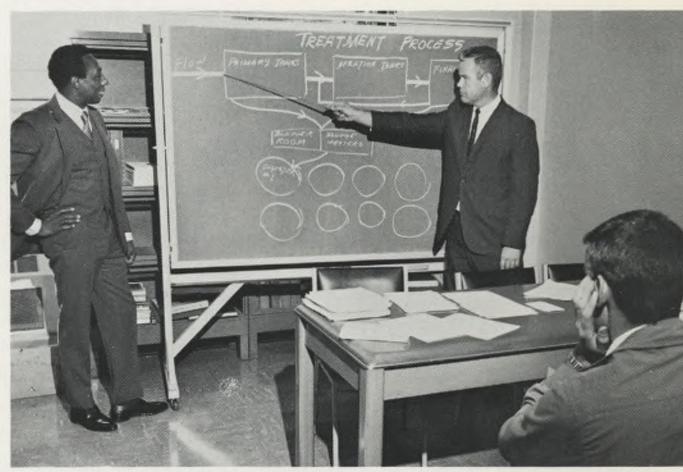
To meet this need, the Water Department's training programs were many and varied:

1. Backed by federal funds, the department initiated a new-type course for sewage plant operators in September, 1969. Forty operators — 25 from Philadelphia and 15 from neighboring communities — attended. The 44-week course was intended by the Federal Water Pollution Control Administration to be a "pilot" for similar courses throughout the nation. It was hoped that such courses would reduce a growing shortage of operators.

2. Engineers — particularly new engineers — were encouraged to take graduate courses in local colleges. Twenty-nine of these took advantage of a "tuition reimbursement" plan, put into effect for the first time by the department.

3. Internal training in plants and offices was extensive. During the two years, 120 engineering aides, sewer maintenance foremen, engineers, and secretaries attended special sessions. The latter covered subjects ranging from surveying to supervision to public relations.

4. For 240 new employees, numerous orientation conferences were conducted. Some employees also attended courses at the Philadelphia Government



Fresh Talent: Many young graduate engineers were hired as a result of visits by department representatives to colleges as far away as the Mississippi River. New engineers visit the computer center (photo).

Training Institute, which is operated by the municipality and local colleges.

5. Forty-two employees attended courses in computer programming, wastewater treatment, or other technical subjects given by industries and professional societies. Many other employees attended brief seminars offered by such organizations.

Recruitment: To find fresh talent with the latest training, the department canvassed colleges from the Atlantic seaboard to points beyond the Mississippi River. Its representatives visited 25 colleges, and hired 30 graduate engineers. The latter were attracted in part by improved salaries and paid graduate study.

Locally, many other positions were filled through normal recruitment, and in April, 1969, a Water Department exhibit was set up at a career fair, sponsored by WCAU Radio Station. The fair attracted many applicants.

Enrollment: Because of inlet-cleaning transfers from the Department of Streets and the filling of engineering vacancies, Water Department personnel increased. As of December 31 each year, the number of full-time permanent employees was 1,557 in 1967; 1,607 in 1968, and 1,626 in 1969.

While making this increase to provide badly needed services, the department managed to retain most of its old employees. The turnover rate for permanent personnel was only 11.4% in 1968 and 9% in 1969. These rates compared with 11.12% in 1967.

In 1968, the department hired 226 permanent employees, but such hiring dropped sharply (to 44) in the first six months of 1969 because of a job freeze in municipal agencies. Hiring to fill vacancies and to clean out inlets pushed the rate up again in the second part of 1969. The total of new, permanent appointments was 175 for the year. Most hiring, however, was temporary, and, because of a high turnover rate, such temporaries totaled 683.

While 259 employees were promoted during the two years, 406 permanent employees were separated. Of the latter, nearly one-quarter (many of them engineers) retired.

To prepare senior employees for retirement, several pre-retirement conferences were held. The counseling, open to spouses as well as employees, included talks by representatives of the Board of Pensions, the Social Security Administration, and the City Department of Public Health. Fifty employees over the age of 60 attended.

Sick leave was higher. It amounted to over 13 days per employee on an annual basis, as against 12.45 in 1967 and lower rates in preceding years.

Other Programs: Many suggestions for improving operations or saving money were submitted by employees. Of the suggestions offered, the municipality's Central Awards Board approved nine for cash awards. These awards ranged from $15 to $100.

EMPLOYEE HONORS

Citation: Mayor James H. J. Tate congratulates William Greene, who was named Water Department "Employee of the Year" in 1969. Greene, though unable to swim, leaped into a deep creek to rescue a child from drowning.

Proficiency: Water Department employees who completed studies in the Philadelphia Government Training Institute receive certificates. Courses ranged from computers to Spanish.

For Service: Employees who completed 25 years of service were inducted into the department's Quarter Century Club. The club has 175 members.

For Caring: Some employees did volunteer work for the community. Mrs. Rosemary Rosenthal holds a plaque awarded her by the Philadelphia Association for Retarded Children.

Employees contributed $60,241 to the United Fund in 1968, and $54,230 in 1969. For the 1968 gift, the department received a "Torchlighter Award."

Twenty-three employees who had completed 25 years of service were honored at a dinner.

THE SAFETY PROGRAM

In tribute to the department's efforts to improve its motor vehicle record, the National Safety Council bestowed "grand" awards on 43 employees who had driven for 10 or 11 years without a preventable accident. With 4.4 million "safe" miles among them, the employees were honored at a special luncheon.

Though not so conspicuously honored 215 other employees received awards in 1968 and 234 in 1969 for driving throughout the previous year without a preventable accident.

Despite these honors, the number of motor accidents jumped in 1968, for the first time in five years. Preventable accidents climbed from 91 in 1967 to 111 in 1968, but turned downward again to 88 in 1969. Non-preventables, which numbered only 51 in 1967, were up to 75 in 1968 and 76 in 1969.

The department, of course, was not resting on past laurels. "Defensive driving" courses were given many employees, with the assistance of the National Safety Council. There were also safety lectures.

Unhappily, the department's well organized program of safety education met with rough going in all areas. The number of disabling injuries per million man hours worked rose to 48.4 in 1968, and dropped only slightly to 43.6 in 1969. These were the highest rates in years. They compared with 34.3 in 1967, and stood in marked contrast to the all-time low of 10.9 in 1966.

Much of the problem could be traced to that old bugaboo, employee carelessness. Over 400 injuries (disabling and non-disabling) resulted from unsafe acts.

More encouraging was the decline in medical treatment cases. These cases, representing non-disabling injuries, dropped from 178 in 1967 to 129 in 1968, and 117 in 1969.

THE ENGINEERING UNITS: FROM DRAWINGBOARD TO CONSTRUCTION

Planning and guiding the department's essential programs, the engineer was in the forefront of operations. Not only was he involved in plants and other facilities, but he provided many supporting functions.

Responsible for the expenditure of millions of dollars yearly, the engineering units planned, designed, constructed, inspected, tested and studied a bewildering variety of projects. With the aid of the new digital computer, much of this was being done with increasing efficiency.

The new computer, indeed, was being used to plot pipeline profiles, do survey calculations, make cost estimates, digest consumption data, and do many other things that once consumed precious hours. A number of computer programs were rewritten.

Safe Drivers: Employees who had driven for 10 or 11 years without a preventable accident received special awards from the National Safety Council. The awards were bestowed on 43 employees at a luncheon in the Belmont filter building.

New Survey Headquarters: After years of operating from cramped quarters, the survey unit moved into a new building in 1969. The $165,000 building contains rooms for drafting, estimating, instrumentation and other purposes.

Planning: The computer was of special value to the small Water and Sewer Systems Planning Unit. This unit used it for hydraulic, cost, size and other studies relating to pipelines.

The unit studied the replacement of the 2.7-mile Thomas Run Sewer in West Philadelphia, storm water relief for the proposed Northeast Freeway, extension of the Wakeling Street Relief Sewer in the Northeast, and auxiliary sources of water supply for "high service" areas of West Philadelphia.

Some studies were also required by urban redevelopment. Thus, in response to urban changes, engineers were updating the entire gravity network for water distribution in West Philadelphia. In addition, water requirements were examined for several key areas, such as West City Hall, Temple University, and Allegheny Avenue, where redevelopment is in progress. Hydraulic information was provided to public agencies concerned with the planning or development of Penn's Landing, Market Street East, the Center City Commuter Railway, and the rerouting of the Frankford Elevated.

As part of a plan to replace old pipelines, hydraulic designs were prepared for 50 miles of water mains and sewers at 500 locations. Plans were also made for the cleaning and cement lining of 94 miles of old mains. The total cost of these replacement and cleaning projects may exceed $20 million.

Design: The 80 employees of the Design Branch prepared "plans, specifications, and estimates" for nearly 500 contracts, with a value of $35 million. These included 71 miles of water mains and 20 miles of sewers at more than 1,500 locations. The water main work involved some cleaning and lining, as well as construction.

Though pipelines were the principal public works on which the unit worked, some minor improvements were designed for plants and pumping stations. The branch worked closely with State Highway engineers to assure proper drainage and efficient pipeline relocation for the new Delaware Expressway and other State highways.

Other work was varied. It included drainage plans, engineering reports, review of plans for service pipes, and field investigations. One duty, however—the processing of sewer rent applications from private firms—was transferred to the Water Pollution Control Division on October 1, 1968.

The Design Branch was partially reorganized in 1968. The 12 squad supervisors, who formerly reported directly to the chief, were placed under two assistant chiefs.

Construction: Backed by a small office force, more than 100 engineers and inspectors kept an eye on 500 field contracts. They trudged through giant sewers, visited muddy trenches, descended into underground pumping stations, inspected newly delivered materials, and, in many other ways, made sure that contract specifications were being fulfilled on new construction projects. These projects were valued at $51 million.

After years of operating from cramped quarters, the Construction Branch's survey unit moved into a new building in the spring of 1969. The one-story brick structure, measuring 50 ft. x 96 ft., was erected at the Queen Lane Water Treatment Plant, at a cost of $165,000. Besides offices, it contains rooms for drafting, estimating, instrumentation, filing and record keeping. It will house 50 survey employees.

Materials Testing: Because of extensive construction by municipal departments, the Materials Testing Laboratory was busier than ever. It made 111,000 physical and chemical tests on 10,800 samples. The rate of testing rose so steadily, indeed, that in the first half of 1969 there were as many tests as in the whole of 1967.

Though the laboratory was charged with testing nearly all materials purchased by the municipality or used in its construction projects, much of the increase stemmed from the erection of a new multi-purpose stadium in South Philadelphia. Numerous concrete cylinders and other materials from this site were submitted for physical testing. Pipes, joints, valves, beams, cement, soils, concrete and asphalt aggregates, from other sites also passed through the laboratory. About 67,000 physical tests were made in 1968-69, compared with 5,600 in 1967. Many inspection visits were paid to plants where materials were fabricated.

While physical tests rose, chemical tests dropped. The 44,000 chemical tests represented an annual rate of only 22,000, or 5,000 less than in 1967. Samples subjected to chemical tests included industrial wastes, boiler water, coal, fuel oil, metals, paints, sand paper, wood products, pump packing, chemicals, antifreeze, seeds, soaps, detergents and many other materials.

Although many samples were still tested by wet chemical methods, an increasing number were checked by instrumentation. Electrochemical, photometric, and other instrumental procedures increased the speed and accuracy of testing in many instances.

The Water Department provided half of *all* samples in 1968, but the Department of Public Property submitted over half in 1969. Other sizable numbers came from the Commerce, Streets and Procurement Departments.

Other Engineering Units: Much work was done by smaller units. Thus the Drainage Information Section reviewed more than 500 plans submitted by private contractors and plumbers for drainage facilities at industrial, commercial and public projects. To check on these and other plans, a unit inspector made over 3,100 visits to job sites. Several hundred drainage plans were revised or updated.

- Engineers of the Water Main Records Section made several thousand drawings and plan revisions for the construction or cleaning of water mains.
- An engineering unit attached to the Wastewater Treatment Section prepared plans and drawings for

new facilities, coordinated instrumentation and automation studies with private firms, worked up applications for federal and state grants, and studied the improvement of plant electrical systems.

• Many stream and storm water studies (described earlier) were made by the Research and Development Unit.

• The Projects Control Section acted as the liaison between the Water Department and the City Council on legislative matters. It also provided information to contractors and processed 312 contracts.

MORE SERVICES FOR THE WATER CUSTOMER

Water customers were asking increasingly for emergency service, and they were getting it as never before. More than 165,000 telephone calls poured into the Customer Service Unit in 1968, and 155,000 in 1969. Except for 1967, the calls were running at an annual rate 30,000 to 40,000 above preceding years.

Along with 30,000 radioed appeals, the calls drew quick response from roving inspectors. The latter checked out flooded cellars, leaking water meters, broken pipelines, clogged inlets, billing abnormalities, and a variety of other problems reported by householders. During the two years, they made over 157,000 inspections—one of the best records in years.

Dispatching emergency crews to make repairs, pump out cellars, or take other action, the Customer Service Unit was on duty 24 hours daily. Much of the period, however, its enrollment was below authorized strength.

To clear up drainage or other sanitary problems, the unit served more than 22,000 "violation" notices on property owners. Compliance by owners was so satisfactory that little over two dozen cases were laid before magistrates. More than 6,000 applications for special billing rates (charity or vacancy) were also investigated and passed upon.

Acting for the Water Commissioner, the chief of Customer Service settled 145 small claims from property owners. These claims covered damage arising from broken water mains and sewers. Authorized by a municipal ordinance adopted in 1966, the settlements represented a saving for the municipality and a quick remedy for the property owner. The department paid out $28,764 in 1968-69. Only 16 claims were rejected.

AN AWARD FOR A MODERN UTILITY

A symbol of Philadelphia's water progress was a small statuette. This was the Advancement Award bestowed by the Pennsylvania Section of the American Water Works Association in June, 1969. Only two years before, the Water Department had won A.W.W.A.'s national award.

The Pennsylvania award recognized the many improvements in physical facilities, customer services, and public relations made by the Water Department.

As part of its public relations program, the department mailed out more than 1,000,000 "inserts," placed exhibits in a half-dozen shows and fairs, distributed thousands of letters to home owners, issued many news releases, and gave away thousands of informative brochures in 1968-69.

Nearly 15,000 persons visited the water treatment plants. Besides school classes and Scout troops, these included many officials and engineers from abroad.

PERSONNEL CHANGES

The most important changes of 1968-69 were as follows:

Promotions

Carmen F. Guarino, from Chief to Deputy Commissioner of the Water Pollution Control Division.

Sanitary Engineers: George W. Carpenter, from Sanitary Engineer IV (Assistant Chief of Wastewater Treatment) to V (Chief of Wastewater Treatment); Sylvester J. Campbell, from Sanitary Engineer III (Superintendent of the Torresdale Water Treatment Plant) to IV (Assistant Chief of Water Treatment); Alan F. Hess, from Sanitary Engineer II to III (Superintendent of the Torresdale Water Plant); Edward F.Shervin, from Sanitary Engineer II to III (Chief of Water Quality Control, Delaware Division); Robert Sharpe, from Sanitary Engineer II to III (Superintendent of Southwest Water Pollution Control Plant); and William Greene, from Sanitary Engineer I to II (Assistant Chief of Research and Development).

Administrative Engineers: Walter H. Clark, from Civil Engineer IV to Administrative Engineer II (Chief of Construction); Richard Starr, from Civil Engineer IV to Administrative Engineer II (Chief of the Collector System); and Ernest Ferrero, from Construction Engineer II to Administrative Engineer I.

Construction Engineers: Morris Abramowitz, Donald J. Crawford, and Thomas Hovanietz, from Construction Engineer I to II.

Civil Engineers: B. Duncan Hubley, Julius Mudry, Stephen Ballay, and Richard Brinkos, from Civil Engineer II to III.

Electrical Engineers: James DeFrisco and Frank Ferrera, from Electrical Engineer II to III.

Other: Kumar Kischinschand, from Assistant Chief to Chief of the Materials Testing Laboratory; Clemons Kasperowicz, from Civil Engineer II to Chief Surveyor; Max Dixon, from Hydraulic Engineer I to II; A. Kirk Jacob, from Administrative Assistant I to II; Richard J. Grochowski and Lynetta Fromhart, from Chemist I to II; and Gerson Korntreger, from Chemist II to III.

New Appointments

Kumar Kischinschand, as Assistant Chief of Materials Testing Laboratory, on September 3, 1968; Nicholas Bubernak, as Civil Engineer III, Design Branch, on November 4, 1968.

Retirements

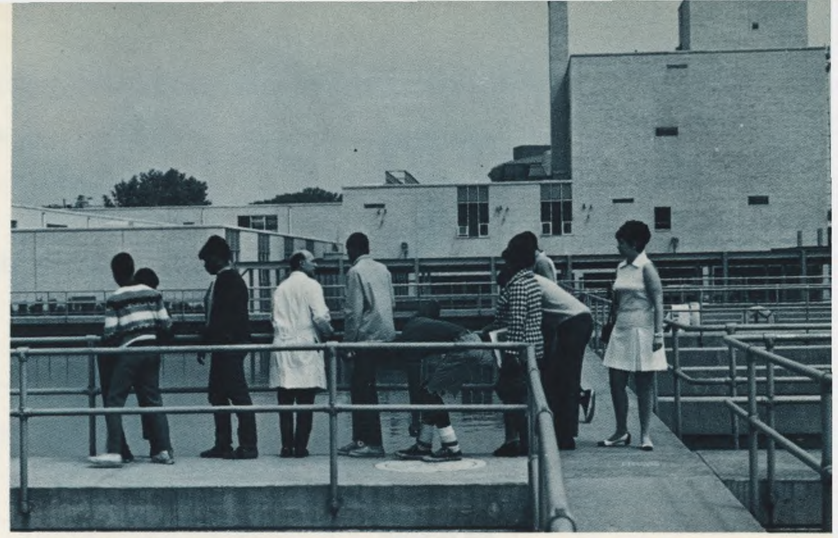
In 1968: Walter G. Thomas, Civil Engineer III (Chief of Survey Section), on January 25; Joseph F. Stork, Civil Engineer II, on March 29; James J. Gass, Civil Engineer IV, on July 8; and Charles G. Day, Civil Engineer III, on September 2.

In 1969: Abraham L. Barmish, Chief of Sewer Maintenance, on January 31; Harry Lopata, Chief of High Pressure Pumping, on February 4; Abraham Finkelstein,, Civil Engineer V (former Chief of Design Branch), on February 14; William R. Crooks, Chief of Materials Testing Laboratory, on March 28; Philip G. McDowell, Architect IV, on April 7; David T. Anderson, Civil Engineer III, on May 2; W. Frank Scott, Civil Engineer II (Chief of Water Main Information), on July 2; and John McCarthy, Administrative Officer, on August 8.

Resignations

Sylvester J. Campbell, Sanitary Engineer IV (Assistant Chief of Water Treatment), on September 13, 1968; John Coscia, Civil Engineer III (Chief of Collector System), on February 5, 1969; and B. Duncan Hubley, Civil Engineer III, on May 3, 1969.

Exhibits: The Water Department presented a variety of displays at shows and conventions. One of the new exhibits was this revolving unit.



Plant Visitors: Nearly 15,000 persons visited the water treatment plants. Besides engineers and officials from abroad, these included many school classes.

Willing Water Week: Nationally observed by water utilities, this week has been proclaimed each year in Philadelphia by the Mayor. Willing Water, the water drop (left), observes City Hall ceremony in 1969.

Champions: Members of the Water Department Employees' Recreation Association were active in a variety of league sports. This team carried off a set of trophies.

Retirement: Many senior engineers retired, and they were given a warm send-off at dinners or other affairs. The chief of the survey unit (center) was one of these.

United Fund Giving: Water Department employees gave generously to community charities. Torchlighter Awards won by the department are held by Phyllis Weber, who became the City Government's "Miss United Fund Torch."

CAPITAL PROJECTS

January 1, 1968 through December 31, 1969

WATER PLANTS AND DISTRIBUTION SYSTEM

Major Projects Completed

			Cost
1.	W-1611	Load Control Center: Installation of 125 solid-state telemeter transmitters and receivers.	$ 96,000
2.	W-1600 thru W-1604 W-1429	Survey Building: Erection of a new building at the Queen Lane Water Plant to house the survey unit; general construction, electrical work, plumbing, heating, air conditioning.	159,000
3.	W-1560-D W-1562-D W-1627-D	Cleaning and cement lining of water mains, ranging from six inches to four feet in diameter, in various parts of the city; also replacement of line valves.	1,175,000
4.	W-1509-E W-1554-E W-1437-E	Eastwick Redelopment Area: Construction of water mains in various locations.	1,007,000

Some of the Larger Projects under Construction on December 31, 1969

			Limit of Contract
1.	W-1448 thru W-1450	Queen Lane Chemical Building: General construction, plumbing and electrical work, on a new chemical storage and treatment building at the Queen Lane Water Plant. 90% completed.	$1,357,000
2.	W-1500 W-1501	Queen Lane Water Storage: Conversion of 22 slow sand filter beds into an underground reservoir for storage of purified water. 30% completed.	3,514,000
3.	W-1471 W-1523	Load Control Center: Installation of solid-state equipment at various microwave towers and at the control center; also installation of a solid-state 200-point capacity data logger at the center. 90% completed.	405,000
4.	W-1464-M	A 48-inch steel main to carry water from the Torresdale Plant to Bucks County. 55% done.	1,000,000

WATER POLLUTION CONTROL PLANTS AND SEWERS

Major Projects Completed

			Cost
1.	SD-340-48-NE SD-367-NEA SD-390-91-99-NEO SD-400-NEO SD-361-NE	Northeast Water Pollution Control Plant: Installation of two outdoor electrical substations, plus an electrical lighting and power facility, to service the air blower building; repair of a 12-inch cast iron pipeline for sludge; replacement of various pumps in the primary and digester tanks.	$ 589,000
2.	SD-340-SW thru SD-343-SW SD-346-SW thru SD-348-SW	Southwest Water Pollution Control Plant: Construction of a new wing, with heaters, for the sludge heating building; replacement of bar screen equipment; erection of an office and equipment building.	543,000
3.	S-3650-A S-3742-62-B S-3772-A S-3811-18-91-A	Construction of three wastewater pumping stations at (1) Linden Avenue and Milnor Street, (2) Lockart Road near Ridgeway Street, and (3) northwest of Rennard Street and northeast of Tomlinson Road.	294,000
4.	S-3699-RD	Replacement of a large collecting sewer in Belfield Avenue from Wagner Avenue to 18th Street.	650,000
5.	S-3616-18-19-E S-3682-E S-3743-73-85-E S-3826-33-E	Eastwick Redevelopment Area: For storm water and sanitary sewers in a variety of locations, including 70th Street, Norwitch Drive, Mario Lanza Boulevard, Essington Avenue, Suffolk Avenue, etc.	4,236,000
6.	S-3771-B S-3773-BD	Sewers to relieve insanitary conditions in State Road from Linden Avenue to Arendell Street, and in several other streets east of State Road and north of Linden Avenue.	527,000
7.	S-3779-80-82-E	Eastwick Redevelopment Area: Sanitary and storm water sewers in various streets.	1,878,000

Some of the Larger Projects under Construction on December 31, 1969

			Limit of Contract
1.	SD-402-04-NE SD-350-52-NE	Northeast and Southwest Water Pollution Control Plants: Installation of gas recirculation systems in 15 digester tanks. 85% completed at Northeast and 50% at Southwest.	$ 660,000
2.	SD-356-SW SD-360-SW thru SD-362-SW	Southwest Plant: Erections of a centrifuge building to separate water from digested sludge. General construction, electrical, heating and plumbing work. 98% completed.	804,000
3.	SD-198-99-SE	Southeast Water Pollution Control Plant: Construction of a new building to store maintenance equipment. 97% completed.	132,000
4.	S-3675-RD	Replacement of sewers in Pine Street between 17th and 25th Streets, and in 23rd Street between Pine and South Streets, plus some water main work. 2% completed.	1,575,000

STORM FLOOD RELIEF

A Major Project Completed

			Cost
1.	S-3395-FBD	Extension of the Main Relief Sewer along Sedgley Avenue from a point 230 feet west of Margie Street to 16th Street and north on 16th to Clearfield Street.	$1,700,000

TABLES and SUMMARIES
FISCAL YEAR
JANUARY 1, 1968 - JUNE 30, 1969

NOTE

Although the main text of this report covers two calendar years, the following data conforms to the City's budgetary period. It is limited to the 18-month transitional fiscal year observed by the City Government in 1968 and the first six months of 1969. On July 1, 1969, the city began a 12-month fiscal year.

WATER FUND - brief financial statement

BALANCE SHEET

ASSETS AND OTHER DEBITS

		December 31,	
Utility Plant	**June 30, 1969**	**1968**	**1967**
Utility Plant in Service	$287,053,836	$284,490,061	$278,942,770
Construction Work in Progress	3,589,458	2,651,785	1,432,669
Unexpended Construction Authorizations	18,050,443	19,255,754	16,909,262
	$308,693,737	**$306,397,600**	**$297,284,701**
Current Assets			
Cash	$ 5,489,930	$ 1,194,317	$ 2,258,308
Accounts Receivable:			
Customers for Utility Service	5,663,492	5,775,322	5,714,306
Other	185,026	156,534	176,850
Estimated Uncollectible Receivables	(1,202,345)	(1,344,780)	(1,391,965)
Materials and Supplies at Standard Cost	1,802,338	1,765,281	1,867,389
Advances to Other Municipal Funds	523,995	3,989,077	2,079,309
Prepaid Expenses	567	102	903
	$ 12,463,003	**$ 11,535,853**	**$ 10,705,100**
	$321,156,740	**$317,933,453**	**$307,989,801**

LIABILITIES AND OTHER CREDITS

Long-Term Debt and Other Credits			
Bonds Payable	$119,588,630	$121,946,548	$117,182,979
Sinking Fund Assets	(3,471,134)	(3,207,875)	(2,863,280)
Bond Authorizations Unissued	6,000,000	6,000,000	10,050,000
	$122,117,496	**$124,738,673**	**$124,369,699**
Excess of Utility Plant and Fund Accounts over Long-Term Bond Commitments	186,576,241	181,658,927	172,915,002
	$308,693,737	**$306,397,600**	**$297,284,701**
Current Liabilities			
Accounts Payable	$ 826,374	$ 704,654	$ 807,011
Payroll Accrued	340,189	382,821	252,793
Overpayment of Revenues	—	—	—
Advances From Other Municipal Funds	383,469	5,975	71,540
	$ 1,550,032	**$ 1,093,450**	**$ 1,131,344**
Surplus and Surplus Reserves			
Reserves for Commitments	$ 928,032	$ 863,900	$ 1,047,709
Surplus:			
Invested in Materials and Supplies	1,802,338	1,765,281	1,867,390
Estimated Collectible Receivables	4,646,174	4,587,076	4,499,191
Available for Appropriation	3,536,427	3,226,146	2,159,466
	$ 9,984,939	**$ 9,578,503**	**$ 8,526,047**
Total Surplus and Surplus Reserves	**$ 10,912,970**	**$ 10,442,403**	**$ 9,573,755**
	$ 12,463,003	**$ 11,535,853**	**$ 10,705,100**
	$321,156,740	**$317,933,453**	**$307,989,801**

STATEMENT OF INCOME AND SURPLUS

	For The 18-Month Fiscal Period Ending June 30, 1969	For The Calendar Years' Ending December 31, 1968	1967
Operating Revenue:			
Metered Sales	$34,716,112	$23,314,451	$22,688,377
Municipal and Other Metered Sales	1,312,051	782,000	868,468
Public Fire Protection	1,748,680	1,062,000	1,130,246
Other Operating Revenues	931,006	658,287	589,841
Total Operating Revenue	**$38,707,849**	**$25,816,738**	**$25,276,932**
Operating Revenue Deductions:			
Operating Expenses, other than Maintenance	$14,800,487	$ 9,719,572	$ 9,216,592
Maintenance Expenses	6,626,173	4,534,042	3,994,137
Total Operating Expenses	**$21,426,660**	**$14,253,614**	**$13,210,729**
Charges in Lieu of Depreciation	9,793,905	6,833,067	6,656,720
Total Operating Revenue Deductions	**$31,220,565**	**$21,086,681**	**$19,867,449**
Operating Income	7,487,284	4,730,057	5,409,483
Other Income	804,559	538,507	425,212
Gross Income	**$ 8,291,843**	**$ 5,268,564**	**$ 5,834,695**
Income Deductions:			
Interest on Long Term Debt	$ 6,216,848	$ 4,056,952	$ 3,846,823
Net Income	**$ 2,074,995**	**$ 1,211,612**	**$ 1,987,872**
Surplus and Surplus Reserves at the Beginning of the Period	9,573,755	9,573,755	7,958,598
Other Adjustments to Surplus (Net)	(735,780)	(342,964)	(372,715)
Total Surplus and Surplus Reserves at the End of the Period	**$10,912,970**	**$10,442,403**	**$ 9,573,755**

WATER FUND — ANALYSIS OF 1968 (18 Month Period — 1/1/68 thru 6/30/69) BUDGETARY OPERATIONS AND COMPARISON WITH ACCRUAL BASIS STATEMENTS

INCOME (by major source)	Budget Estimate (1)	Actual Receipts	Receipts Compared with Estimates	% of Estimate Realized	Accrual Basis Income (2)
Water Sales:					
Collections on Current Billings (with penalties)	$31,697,000	$30,481,346	$(1,215,654)	96.2%	$34,716,112
Collections on Past Billings (with penalties and interest)	3,467,000	4,260,749	$ 793,749	122.9	679,099
Total Water Sales	**$35,164,000**	**$34,742,095**	**$(421,905)**	**98.8%**	**$35,395,211**
Meter Installations (Water Fund share - 60%)	198,000	216,360	18,360	109.3	218,408
Miscellaneous Income	1,194,500	922,570	(271,930)	77.2	856,899
Interest Earnings	495,000	505,386	10,386	102.1	494,352
Payments from Other City Funds:					
General Fund:					
Water Sales to City Agencies	1,060,500	1,199,551	139,051	113.1	1,312,051 (3)
Fire Protection Services	1,593,000	1,748,680	155,680	109.8	1,748,680 (3)
Sewer Fund:					
Joint Fund Expenses	1,321,000	1,453,221	$ 132,221	110.0	1,447,265 (3) (4)
TOTAL INCOME	**$41,026,000**	**$40,787,863**	**$ (238,137)**	**99.4%**	**$41,472,866**

OUTGO (by major object of expenditure)		Final Obligations		Lapses		Accrual
Operations	Final Appropriations	Amount	% of Total	Amount	%	Basis Expenses
Water Operations:						
Salaries and Wages	$11,561,600	$11,240,995	28.3%	320,605	2.8%	$10,833,711
Purchases of Services by Contract	3,216,900	3,203,185	8.1	13,715	.4	3,159,251
Materials and Supplies	4,802,000	4,755,846	12.0	46,154	1.0	4,172,616
Equipment	369,000	364,963	.9	4,037	1.1	1,235,680
Miscellaneous	1,500	720	—	780	52.0	722
Payments to General Fund:						
Financial Services; Reading Meters, Billing, etc.	1,945,077	2,123,372	5.3	(178,295)	—	2,123,372 (3)
Other Services Rendered	1,543,923	1,544,839	3.9	(916)	—	1,544,839 (3)
Contributions to Bond Fund	90,000	90,000	.2	0	.0	90,000
Total Water Operations	**$23,530,000**	**$23,323,920**	**58.7%**	**$ 206,080**	**.9%**	**$23,160,191**
Employees' Welfare Plan Payments	360,000	316,418	.8%	43,582	12.1	316,418
Claims and Awards	100,000	67,817	.2	32,183	32.2	67,817
Employees' Pension Fund Payments	1,018,500	1,210,600	3.0	(192,100)	—	1,210,600 (3)
Refunds	34,750	21.176	.1	13,574	39.1	21,176
Workmen's Compensation	29,750	27,660	.1	2,090	7.0	27,660
Provision for Estimated Uncollectible Receivables	—	—	—	—	—	(189,621)
Total Operations	**$25,073,000**	**$24,967,591**	**62.9%**	**$ 105,409**	**.4%**	**$24,614,241**
Capital Payments						
Debt Service:						
Amortization of Principal	$ 8,062,000	$ 8,041,782	20.2%	$ 20,218	.3%	$ 8,041,782
Interest	6,265,000	6,216,848	15.6	48,152	.8	6,216,848 (3)
Capital Budget Financing	525,000	525,000	1.3	0	.0	525,000
Total Capital Payment	**$14,852,000**	**$14,783,630**	**37.1%**	**$ 68,370**	**.5%**	**$14,783,630**
TOTAL OUTGO	**$39,925,000**	**$39,751,221**	**100.0%**	**$ 173.779**	**.4%**	**$39,397,871**

SUMMARY COMPARISON OF 1968 BUDGETARY OPERATIONS
(Original and Actual Budgets)

	Budget Estimate (1)	Encumbrance Basis Actual	Change	Accrual Basis (6)
Surplus, December 31, 1967	**$ 2,435,000**	**$ 2,165,993**	**$ 269,007**	**$ 9,573,755**
Add or (Subtract): Adjustment of Prior Years' Operations	0	344,334	(344,334)	(735,779)
Add: 1968 Income	41,026,000	40,787,863	238,137	41,472,866
Total 1968 Resources	**$43,461,000**	**$43,298,190**	**$ 162,810**	**$50,310,842**
Less: 1968 Outgo	39,925,000	39,751,221	173,779	39,397,871
Surplus, June 30, 1969	**$ 3,536,000**	**$ 3,546,969**	**$ (10,969)**	**$10,912,971**

NOTES:

(1) Budget as proposed by the Mayor and adopted by Council in November, 1967.

(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

SEWER FUND - brief financial statement

BALANCE SHEET

ASSETS AND OTHER DEBITS

		December 31	
Utility Plant	**June 30, 1969**	**1968**	**1967**
Utility Plant in Service	$393,720,268	$389,457,282	$378,822,915
Construction Work in Progress	6,727,170	6,233,035	5,213,996
Unexpended Construction Authorizations	17,496,950	20,149,987	18,713,982
	$417,944,388	**$415,840,304**	**$402,750,893**
Current Assets			
Cash	$ 5,723,207	$ 5,421,273	$ 4,750,073
Accounts Receivable:			
Customers, for Utility Service	5,192,860	5,085,710	5,103,339
Other	67,573	24,665	110,234
Estimated Uncollectible Receivables	(953,516)	(1,016,596)	(1,068,857)
Materials and Supplies at Standard Cost	245,215	235,115	224,043
Advances to Other Municipal Funds	107,087	25,977	541,812
Prepaid Expenses	—	—	4
	$10,382,426	**$ 9,776,144**	**$ 9,660,648**
	$428,326,814	**$425,616,448**	**$412,411,541**

LIABILITIES AND OTHER CREDITS

	June 30, 1969	1968	1967
Long Term Debt and Other Credits			
Bonds Payable	$185,873,247	$188,230,507	$186,432,772
Sinking Fund Assets	(6,528,557)	(5,956,147)	(5,231,536)
Bond Authorizations Unissued	13,200,000	13,200,000	9,450,000
	$192,544,690	**$195,474,360**	**$190,651,236**
Excess of Utility Plant and Fund Accounts over Long Term Bond Commitments	225,399,698	220,365,944	212,099,657
	$417,944,388	**$415,840,304**	**$402,750,893**
Current Liabilities			
Accounts Payable	$ 202,383	$ 191,006	$ 207,646
Payroll Accrued	155,595	178,298	100,436
Overpayment of Revenues	—	—	—
Advances from Other Municipal Funds	379,958	126,541	120,785
	$ 737,936	**$ 495,845**	**$ 428,867**
Surplus and Surplus Reserves			
Reserves for Commitments	$ 1,168,719	$ 1,368,844	$ 1,221,189
Surplus:			
Invested in Materials and Supplies	245,215	235,115	224,043
Estimated Collectible Receivables	4,312,873	4,023,623	4,158,777
Available for Appropriation	3,917,683	3,652,717	3,627,772
	$ 8,475,771	$ 7,911,455	$ 8,010,592
Total Surplus and Surplus Reserves	$ 9,644,490	$ 9,280,299	$ 9,231,781
	$ 10,382,426	**$ 9,776,144**	**$ 9,660,648**
	$428,326,814	**$425,616,448**	**$412,411,541**

STATEMENT OF INCOME AND SURPLUS

	For The 18-Month Fiscal Period Ending June 30, 1969	For the Calendar Years Ending December 31 1968	1967
Operating Revenue:			
Metered Sales	$28,566,743	$19,182,928	$18,756,661
Municipal and Other Metered Sales	1,315,360	1,038,322	1,104,925
Other Operating Revenues	432,188	372,269	323,564
Total Operating Revenues	**$30,314,291**	**$20,593,519**	**$20,185,150**
Operating Revenue Deductions:			
Operating Expenses, Other than Maintenance	$ 8,060,013	$ 5,216,645	$ 4,717,170
Maintenance Expenses	2,824,345	1,846,584	1,820,555
Total Operating Expenses	**$10,884,358**	**$ 7,063,229**	**$ 6,537,725**
Charges in Lieu of Depreciation	11,852,111	8,944,605	8,383,888
Total Operating Revenue Deductions	**$22,736,469**	**$16,007,834**	**$14,921,613**
Operating Income	7,577,822	4,585,685	5,263,537
Other Income	2,205,717	1,850,207	1,801,813
Gross Income	**$ 9,783,539**	**$ 6,435,892**	**$ 7,065,350**
Income Deductions:			
Interest on Long Term Debt	$ 9,213,633	$ 6,089,827	$ 5,716,136
Net Income	**$ 569,906**	**$ 346,065**	**$ 1,349,214**
Surplus and Surplus Reserves at the Beginning of the Period	9,231,781	9,231,781	8,155,107
Other Adjustments (Net)	(157,198)	(297,547)	(272,540)
Total Surplus and Surplus Reserves at the End of the Period	**$ 9,644,489**	**$ 9,280,299**	**$ 9,231,781**

SEWER FUND — ANALYSIS OF 1968 (18 Month Period — 1/1/68 thru 6/30/69)
BUDGETARY OPERATIONS AND COMPARISON WITH ACCRUAL BASIS STATEMENTS

INCOME (by major source)	Budget Estimate (1)	Actual Receipts	Receipts Compared with Estimates	% of Estimate Realized	Accrual Basis Income (2)
Sewer Charges:					
Collections on Current Billings (with penalties)	$25,844,000	$24,696,954	$(1,147,046)	95.6%	$28,566,743
Collections on Past Billings (with penalties and interest)	3,132,000	3,942,942	810,942	126.4	399,762
Total Sewer Charges	**$28,976,000**	**$28,639,896**	**$ (336,104)**	**98.8%**	**$28,966,505**
Sewer Charges to Other Municipalities	550,000	583,322	33,322	106.1	583,322
Meter Installations (Sewer Fund Share-40%)	168,000	134,437	(33,563)	80.0	134,437
Miscellaneous Income	125,000	125,930	930	100.7	157,667
Interest Earnings	739,000	651,823	(87,177)	88.2	623,711
Payments from Other City Funds:					
General Fund: Sewer Services to City Agencies	744,000	783,631	39,631	105.3	732,038
State Reimbursement for Clean Streams Program	1,335,000	1,345,970	10,970	100.8	1,345,970
TOTAL INCOME	**$32,637,000**	**$32,265,009**	**$ (371,991)**	**98.9%**	**$32,543,650**

OUTGO (by major object of expenditure)	Final Appropriations	Final Obligations Amount	Final Obligations % of Total	Lapses Amount	Lapses %	Accrual Basis Expenses
Operations						
Wastewater Operations:						
Salaries and Wages	$ 4,309,700	$ 4,275,440	13.3%	$ 34,260	.8	$ 4,264,284
Purchase of Services by Contract	2,519,300	2,089,578	6.5	429,722	17.1	2,062,399
Materials and Supplies	460,500	338,383	1.1	122,117	26.5	332,902
Equipment	407,500	390,680	1.2	16,820	4.1	414,436
Miscellaneous	500	40	—	460	92.0	40
Payments to General Fund:						
Financial Services, Reading Meters, Billing, etc.	1,441,198	1,566,739	4.9	(125,541)	—	1,566,739
Other Services Rendered	457,802	427,513	1.3	30,289	6.6	427,513
Payments to Water Fund:						
Joint Fund Expenses	1,321,500	1,453,221	4.5	(131,721)	—	1,447,265
Contributions to Bond Fund	60,000	60,000	.2	0	—	60,000
Total Wastewater Operations	**$10,978,000**	**$10,601,594**	**33.0%**	**$ 376,406**	**3.4%**	**$10,575,578**
Employees' Welfare Plan Payments	168,000	162,939	.5	5,061	3.0	162,939
Claims and Awards	75,000	74,952	.2	48	.1	72,311
Employees' Pension Fund Payments	457,000	607,900	1.9	(150,900)	—	607,900
Refunds	30,000	19,049	.1	10,951	36.5	19,049
Workmen's Compensation	0	0	.0	0	.0	—
Provision for Estimated Uncollectible Receivables	—	—	—	—	—	(115,341)
Total Operations	**$11,708,000**	**$11,466,434**	**35.7%**	**$ 241,566**	**2.1%**	**$11,322,436**
Capital Payments						
Debt Service:						
Amortization of Principal	$10,954,000	$10,912,675	34.0%	$ 41,325	.4%	$10,912,675
Interest	9,261,000	9,213,633	28.7	47,367	.5	9,213,633
Capital Budget Financing	525,000	525,000	1.6	0	.0	525,000
Total Capital Payments	$20,740,000	$20,651,308	64.3%	$ 88,692	.4%	$20,651,308
TOTAL OUTGO	**$32,448,000**	**$32,117,742**	**100.0%**	**$ 330,258**	**1.0%**	**$31,973,744**

SUMMARY COMPARISON OF 1968 BUDGETARY OPERATIONS
(Original and Actual Budgets)

	Budget Estimate (1)	Encumbrance Basis Actual	Encumbrance Basis Change	Accrual Basis (5)
Surplus, December 31, 1967	**$ 4,044,000**	**$ 3,627,772**	**$ 416,228**	**$ 9,231,781**
Add or (Subtract): Adjustment of Prior Years' Operations	0	142,644	(142,644)	(157,198)
Add: 1968 Income	32,637,000	32,265,009	371,991	32,543,650
Total 1968 Resources	**$36,681,000**	**$36,035,425**	**$ 645,575**	**$41,618,233**
Less: 1968 Outgo	32,448,000	32,117,742	330,258	31,973,744
Surplus, June 30, 1969	**$ 4,233,000**	**$ 3,917,683**	**$ 315,317**	**$ 9,644,489**

NOTES:
(1) Budget as proposed by the Mayor and adopted by Council in November, 1967.
(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

CURRENT FINANCE:

SUMMARY FOR THE FISCAL YEAR

JANUARY 1, 1968 - JUNE 30, 1969

Water Department revenues stayed ahead of accelerating costs. As a result, the Water and Sewer Funds closed the 18-month "fiscal year" with a combined surplus of $7,465,000.

All of this was according to plan. The water and sewer rates, established on January 1, 1967, were designed to accumulate surpluses in the early years to offset a later rise in costs. It was expected that this surplus would disappear in fiscal 1970-71, unless the rates were again revised.

WATER FUND

The income of the Water Fund totaled $40,788,000, or $1,037,000 more than outgo.

The total income, indeed, fell only slightly ($238,000 or 0.4%) below the original budgetary estimates. Although current water sales ($30,481,000) represented only 96.2% and miscellaneous income ($922,000) only 77.2% of original estimates, the yield from other sources was higher. Thus past billings ($4,261,000) were $794,000 greater than expected, while payments from the City's General and Sewer Funds ($4,401,000) for normal services were $427,000 more.

Of the $39,751,000 of Water Fund obligations, debt service accounted for the largest share. It totaled $14,258,000, or 37.1%. Personal services cost $11,241,000, or 28.3%; materials, supplies and equipment $5,120,000, or 12.9%; payments to the General Fund $3,668,000, or 9.2%; and purchase of services $3,203,000, or 8.1%.

Water Fund obligations were just 0.4%, or $174,000, short of total appropriations, despite substantial lapses in many appropriations. Such lapses (or unused funds) included $321,000 in personal services, $68,000 in debt service, $50,000 in materials, supplies and equipment, and $44,000 in employee welfare plans. These lapses were offset, however, by higher payments for other purposes. Thus payments to the General Fund exceeded the original appropriation by $179,000, while pension plan payments were $192,000 more. These higher payments are permitted by budget ordinance through adjustments in surplus.

The sum of $344,000 was added to surplus by the merging of encumbrances from previous years. As a result, the Water Fund ended the 18-month period with a cumulative cash surplus of $3,547,000, an increase of $1,381,000 over December 31, 1967.

SEWER FUND

The income of the Sewer Fund also ran ahead of obligations. It totaled $32,265,000, or $147,000 more than outgo.

In budgetary terms, however, revenues were $372,000 below original estimates and represented about 98.9% of the latter. While collections from current billings ($24,697,000) fell $1,147,000 below predictions, this drop was partially offset by the receipt of

CAPITAL ACTIVITY

Calendar Year 1968	Water Works	Water Pollution Control Works	Storm Flood Works	Total
Capital contracts encumbered				
January 1, 1968	**$ 6,855,568**	**$11,503,227**	**$1,361,924**	**$19,720,719**
Add: Capital work initiated in 1968	**10,592,668**	**8,741,822**	**52,028**	**19,386,518**
Total: Net capital activity in 1968	**$17,448,236**	**$20,245,049**	**$1,413,952**	**$39,107,237**
Less: Capital expenditures in 1968	**6,273,033**	**11,489,849**	**764,034**	**18,526,916**
Capital contracts still encumbered				
December 31, 1968	**$11,175,203**	**$ 8,755,200**	**$ 649,918**	**$20,580,321**
Fiscal Year January 1, 1968 to June 30, 1969				
Capital contracts encumbered				
January 1, 1968	**$ 6,855,568**	**$11,503,227**	**$1,361,924**	**$19,720,719**
Add: Capital work initiated in 18 months	**18,533,620**	**20,106,040**	**81,013**	**38,720,673**
Total: Net capital activity in 18 months	**$25,389,188**	**$31,609,267**	**$1,442,937**	**$58,441,392**
Less: Capital expenditures in 18 months	**9,662,384**	**16,418,785**	**1,151,051**	**27,232,220**
Capital contracts still encumbered				
June 30, 1969	**$15,726,804**	**$15,190,482**	**$ 291,886**	**$31,209,172**

SUMMARY OF CAPITAL ACTIVITY—1963 to 1968

	1963	1964	1965	1966	1967	1968
Capital contracts encumbered January 1	$28,844,980	$32,616,431	$22,564,025	$15,290,618	$15,641,384	$19,720,719
Add: Capital work initiated	28,361,397	23,049,586	15,205,913	17,929,890	23,094,060	19,386,518
Total: Net capital activity	$57,206,377	$55,666,017	$37,769,938	$33,220,508	$38,735,444	$39,107,237
Less: Capital expenditures	24,589,946	33,101,992	22,479,320	17,579,124	19,014,725	18,526,916
Capital contracts still encumbered December 31	$32,616,431	$22,564,025	$15,290,618	$15,641,384	$19,720,719	$20,580,321

$811,000 more than expected from billings that were past due. The latter totaled $3,943,000. Earnings from interest and meter installations were down slightly, while collections from other municipalities and the General Fund for sewer services were better than expected.

Debt service bore heavily on the Sewer Fund. Of the $32,118,000 in outgo, debt service represented $20,126,000, or 63%. Personal services cost $4,275,-000, or 13.3%; purchase of services $2,090,000, or 6.5%; payments to the General Fund $1,994,000, or 6.2%; and payments to the Water Fund $1,453,000, or 4.5%.

Sewer Fund obligations ran $330,000 below available appropriations. This resulted in part from sizable appropriation lapses, which included $430,000 in purchase of services, $139,000 in materials, supplies and equipment, and $34,000 in personal services. These savings were offset in part by the payment of $95,000 more to the General Fund for interfund services and $132,000 more to the Water Fund for joint fund expenses.

The merger of prior years' encumbrances added $143,000 to surplus. As a result, the Sewer Fund had a cumulative cash surplus of $3,918,000 on June 30, 1969, or $290,000 more than at the end of 1967.

PUBLISHED BY THE PHILADELPHIA WATER DEPARTMENT