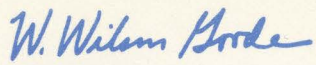
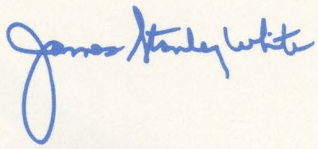
Philadelphia Water Department

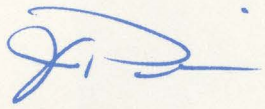
1989 Annual Report



W. Wilson Goode
Mayor



James Stanley White
Managing Director



John Plonski
Water Commissioner

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Introduction

Our Fiscal Year 1989 Annual Report focuses upon programs which achieved notable success by attaining one of the four major goals of the Philadelphia Water Department. These four goals frame our work as we approach the year 2000, as they embrace a broad spectrum of environmental and public agendas.

To Protect and Improve the Environment. The Philadelphia Water Department operates with the premise that it is foremost an environmental utility. The Water Department's desire and dedication to protect the environment provides the impetus to preserve and improve our water and wastewater quality and treatment. This Annual Report highlights two of our programs which illustrate this spirit: sludge recycling and utilization and the Combined Sewer Overflow (CSO) program.

To Heighten Service to the Public. The Philadelphia Water Department strives to strengthen its customer-oriented approach to serving and meeting our customers' requests and need for services. We also wish to contribute to the vitality of Philadelphia's communities by being a "good neighbor" to the communities where our facilities are located. This Annual Report features a number of programs and department organizations which exemplify these principles: the Customer Information Unit, hydrant abuse program, flood relief projects, water distribution and cogeneration.

To Maintain Sound Operational and Financial Management. The Philadelphia Water Department is nearing the end of a period of phenomenal facilities' construction and expansion and therefore wishes to concentrate on the achievement of stable operation and sound financial management. Facility construction, corrosion control, water and wastewater bonds, and wholesale customer agreements are components of this plan.

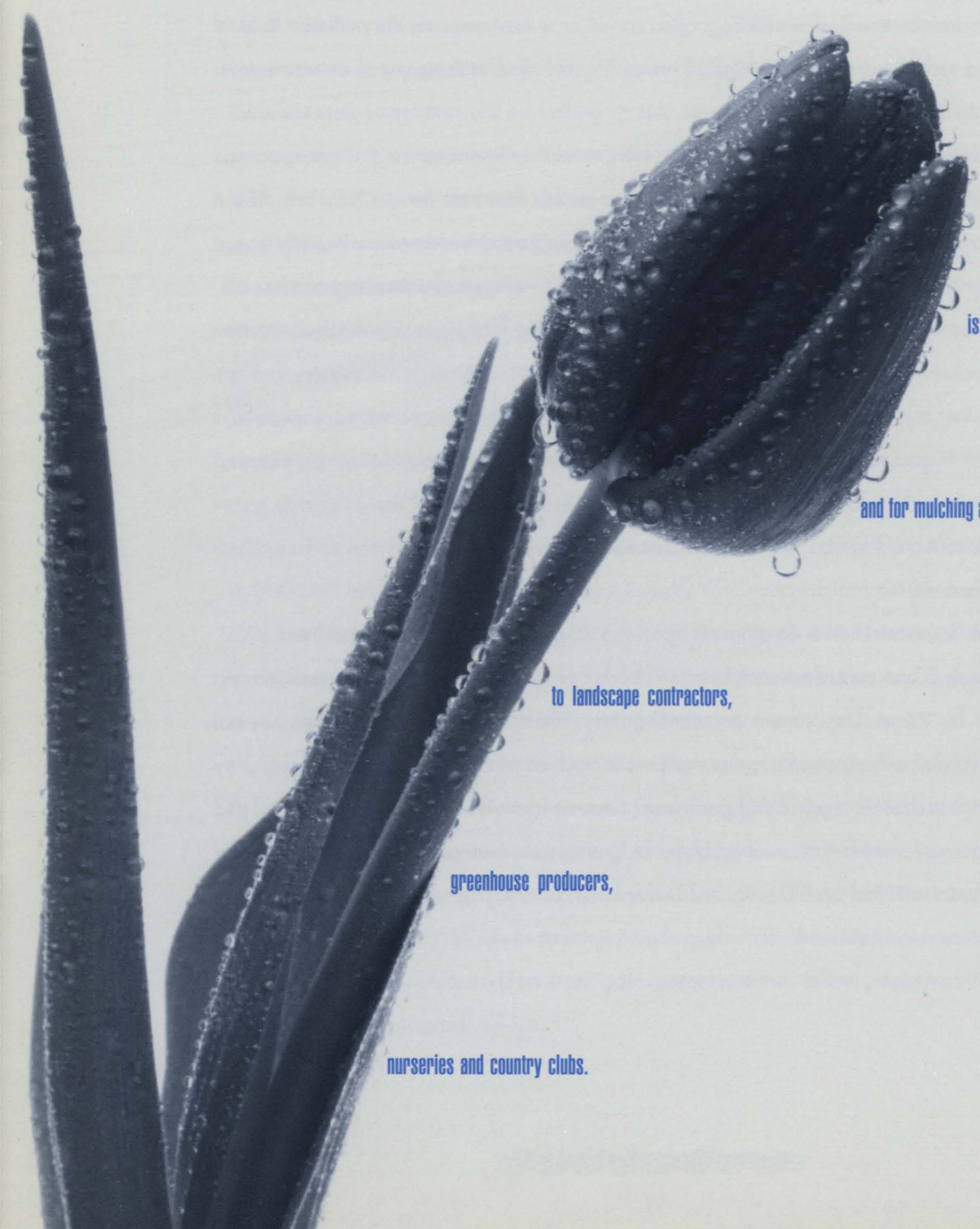
To Establish a Departmental Organizational Development Plan. The Philadelphia Water Department is working to develop an effective organizational plan which will engender optimum inter-departmental communication. The Managing Differences Seminars and the Graduate Engineer Recruitment project are notable endeavors in this area.

Sludge Utilization

The Water Department's Sludge Management Unit (SMU) organizes one of the nation's foremost programs for land-based use of sludge and sludge products. During Fiscal Year 1989, SMU distributed 155,000 tons of sludge products to a wide variety of customers, including farmers, mine operators, horticultural operators and commercial landscape firms. Stripmine reclamation continues to be one of the foundations of SMU's program for beneficial sludge use, with nearly 50,000 tons of a specially prepared product called "Mine Mix" spread and incorporated into 200 acres of completed, stripmined lands, providing essential nutrients and organic matter necessary to support vigorous plant growth. A special feature of the program in Fiscal Year 1989 was the shipment of 53,000 tons of Mine Mix by rail to a project site in the southwestern corner of Virginia, known as the Powell River Project.

The Powell River Project is a major research and educational effort that focuses on the environmental, social and economic issues of the southwestern Virginia coal fields. The Project emphasizes its scientific resources on the integration of coal and mineral mining with environmental protection and improved quality of life. In order to reclaim stripmined lands, the Project proposed a research/demonstration project to determine the feasibility of a sewage sludge product as a topsoil alternative in stripmine reclamation. Beginning in May 1989, the Water Department, through its reclamation contractor, began transportation of its nutrient-rich recycled Mine Mix by rail. The first phase of the project ended in August 1989 with plans to resume operations in the spring of 1990.

Another notable accomplishment of SMU in Fiscal Year 1989 was the marketing of 30,000 tons of the most highly processed sludge compost produce - EarthLife screened compost. This product is ideal for turf renovation and for mulching and is sold to landscape contractors, greenhouse producers, nurseries and country clubs by a marketing contractor and a network of dealers. The special effort of the marketing program in Fiscal Year 1989 resulted in expansion of sales volume by 50 percent over the previous fiscal year.



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Combined Sewer Overflow Project

Extensive research done by the Water Department in the mid-1970s showed that a high percentage of pollutant loading from Combined Sewer Overflows (CSOs), was carried in the initial surcharge which sweeps sewage solids over outfall weirs into waterways during major storms. Research also indicated that the city's large combined sewer collectors could retain a good portion of the first flush under controlled conditions, thus reducing the pollution to local streams and increasing the percentage of storm flow handled at the city's three wastewater treatment plants.

Between 1978 and 1980, three prototypes were developed for the inline storage system, modifying three sewer regulators in order to control flow from remote locations. These prototypes were linked to the Water Department's host computer at the Northeast Plant by leased data lines, allowing control of the regulator gates to balance upstream flooding and bypass.

To control this stormwater runoff, monitoring stations, which consist of instrumentation such as flow level sensors and rain gauges, have been installed in combined sewers throughout the Northeast section of the city. Signals from these field instruments are transmitted to a process control computer located at Sewer Maintenance Headquarters, notifying operating personnel when combined sewers are near capacity. By operating the discharge gates remotely, stormwater flows can be controlled instead of being automatically released into rivers and streams.

The Combined Sewer Overflow Project was 98 percent complete in Fiscal Year 1989. Approximately 50 percent of the equipment has been operational at least one year and is being maintained by Water Department personnel. Department employees have made several modifications and enhancements to this equipment, such as installing panel meters to display gate positions and sewer levels, adding software, timers and counters for motors cycling off and on, which allows for the detection of problems before they can cause equipment failure. Solar cells have been installed on all combined sewer overflow equipment that is out of warranty, effectively charging batteries in the monitoring equipment.

Monitoring stations which consist of instrumentation such as flow level sensors and rain gauges have been installed in combined sewers to control stormwater runoff throughout Northeast Philadelphia.

Customer Information Unit

Recognizing the importance of responding to customers' inquiries and problems, the Water Department began to reshape its service policies several years ago. The result was the creation of a new unit. Customer Information's primary role is to provide a sensitive and caring approach while resolving the approximately 225,000 water and sewer inquiries that the Department receives annually.

The Customer Information Unit consists of 10 service representatives who handle all water and sewer-related complaints and questions, two administrative technicians who are responsible for more complex complaints, and a supervisor who oversees the entire operation of the unit. These employees are the customer's initial contact with the Department and therefore carry the awesome responsibility of handling an inquiry effectively and quickly. The Customer Information staff must have a thorough knowledge of the operations of the Department, its employees, and the various functions of each water and wastewater unit. These employees must not only report customers' problems to the appropriate unit, they must also explain to customers any problems the units may have when completing repairs.

The way in which complaints were received and information disseminated took on a new dimension in 1988 with the computerization of the public's requests through a work order system. Since the system has been computerized, Customer Information is able to specifically identify types of complaints, such as sewer maintenance, hydrants and inlets, and input them directly into the system, as well as track the complaints to completion. Customer Information is able to track when a specific service is in demand, on a month-to-month basis, and how that demand for service may change from year to year. Customer Information is also able to identify total yearly requests for such services as inlet cleaning versus taste and odor complaints, and, as a result, the Water Department is able to identify specific problems and their patterns and tackle them accordingly.

The primary role of the Customer Information Unit is to provide a sensitive and caring approach while resolving the approximately 225,000 water and sewer inquiries the Water Department receives annually.

Public Education's

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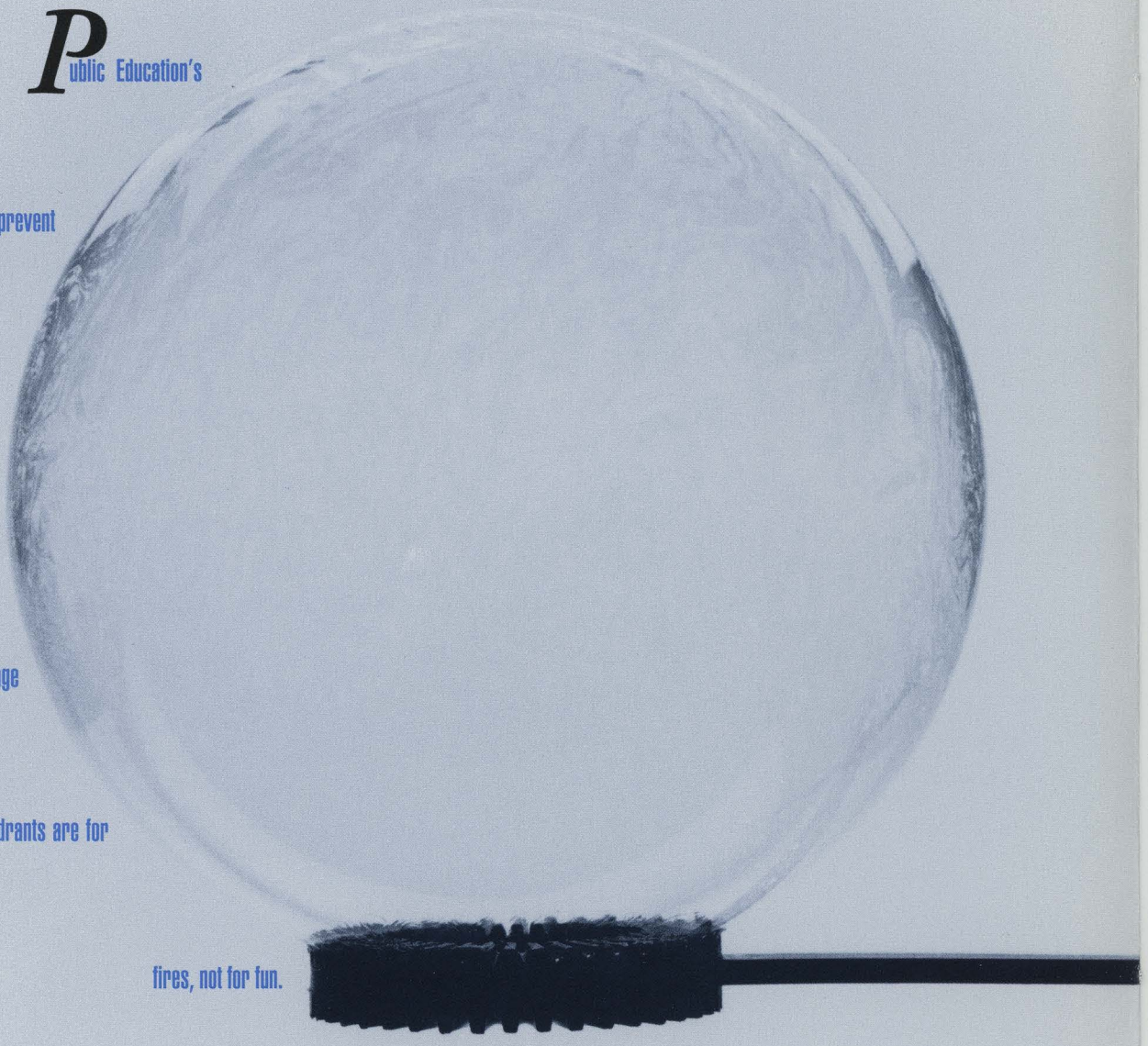


Hydrant Abuse Program

The Public Affairs Division's Public Education Unit operates an aggressive hydrant abuse education campaign each summer to reduce illegal opening of fire hydrants. The campaign has components aimed at both children and adults, spreading the message that hydrants are for fires, not for fun.

The Public Education Unit begins reaching the city's children in June, supplying educational materials to every public and parochial school student. Coloring calendars are given to children in kindergarten through the 3rd grade while "Stay Cool Guides," which list fun ways to beat the summer heat without opening fire hydrants, are distributed to students in the 4th through 12th grades.

The Unit's Hydrant Outreach Team (HOT) champions the hydrant abuse message throughout the summer by visiting day camps, recreation centers, community fairs, YMCAs and block parties. The HOT focuses on children between the ages of four and 14, teaching them about the dangers of fire hydrant abuse with an innovative, oversized, illustrated storybook featuring the "Plug Uglies." The HOT distributes games and activity books to its audiences to encourage children to learn by heart the campaign's slogan, "Hydrants are for Fires, Not for Fun." In Fiscal Year 1989, the HOT visited 50 locations and reached 3,500 children.

The Public Education Unit also recruits the city's 6,500 block captains and community leaders to remind their neighbors that "when you mess with hydrants, you're messin' with fire." They are provided with educational materials such as flyers, window posters and decals. The adult population is also reached through the Clean Philadelphia Caravan, which travels throughout the city during the summer months. Captain Sewer and a community educator accompany the Caravan, describing the dangers of hydrant abuse to 5,000 citizens each summer, one-on-one. The hydrant abuse message is also spread through posters carried on Water Department vehicles and SEPTA buses, press releases, and professionally produced television and radio public service announcements.

The effectiveness of the Department's hydrant abuse education campaign will be measured over a period of years, with reductions in water pumped, peak demands, low pressure episodes, and costs of treatment and pumping. With the roots of the current campaign extending back to 1985, we anticipate many more years of effort to achieve lasting results.

The Water Distribution Unit has been investigating a technique known as "linestopping" to reduce the inconvenience to residents during water main repair work.

Water Distribution

The Water Distribution Unit has been investigating a technique known as "linestopping" to reduce the inconvenience to residents during water main repair work. A linestopper is an apparatus that can be installed in water mains from 6 inches in diameter to 12 inches, and effectively seals off a section of main by the application of a sleeve and rubber disk into the main to stop the flow of water. Between two given points, two linestoppers are able to close off respective sections of water main without shutting down the entire main in order to make repairs.

Although this technique is not usable in all situations, when it can be applied, it certainly offers a number of advantages. In Fiscal Year 1989, the linestopping technique was used on 16th Street south of Cuthbert Street. In this area, there are many multi-story buildings that would have been affected when the water mains were shut down due to a defective valve that had to be repaired. However, with the use of linestoppers, Water Distribution was able to seal off a major section of this area and do the necessary work without disruption to water service to many businesses in the area while maintaining continuous fire protection.

Flood Relief Projects

Following extensive investigations regarding two separate stormwater relief systems, the Design Branch of the Water Department is in the process of designing and modifying both systems for flood relief control. The Magee-Hellerman Flood Relief Project involves a reinforced concrete box sewer in Magee Avenue from Brous Street to Cottage Street. The 12.5 foot by 6.5 foot box sewer is approximately one mile long and is expected to relieve flooding conditions for 840 homes in the Mayfair section of Philadelphia. The estimated cost of the project is $7.5 million.

The reconstruction of the Dobson's Run Sewer is currently being designed. This reconstruction consists of approximately 3,100 feet of separate sewer systems from Wissahickon Avenue to Stokley Street. The increase in size of the stormwater conduit shall greatly increase the capacity of the Dobson's Run system. The estimated cost of this project is $3.5 million

Cogeneration facilities will use over 90 percent of the methane produced as fuel to generate electricity and hot water to operate the wastewater treatment plants.

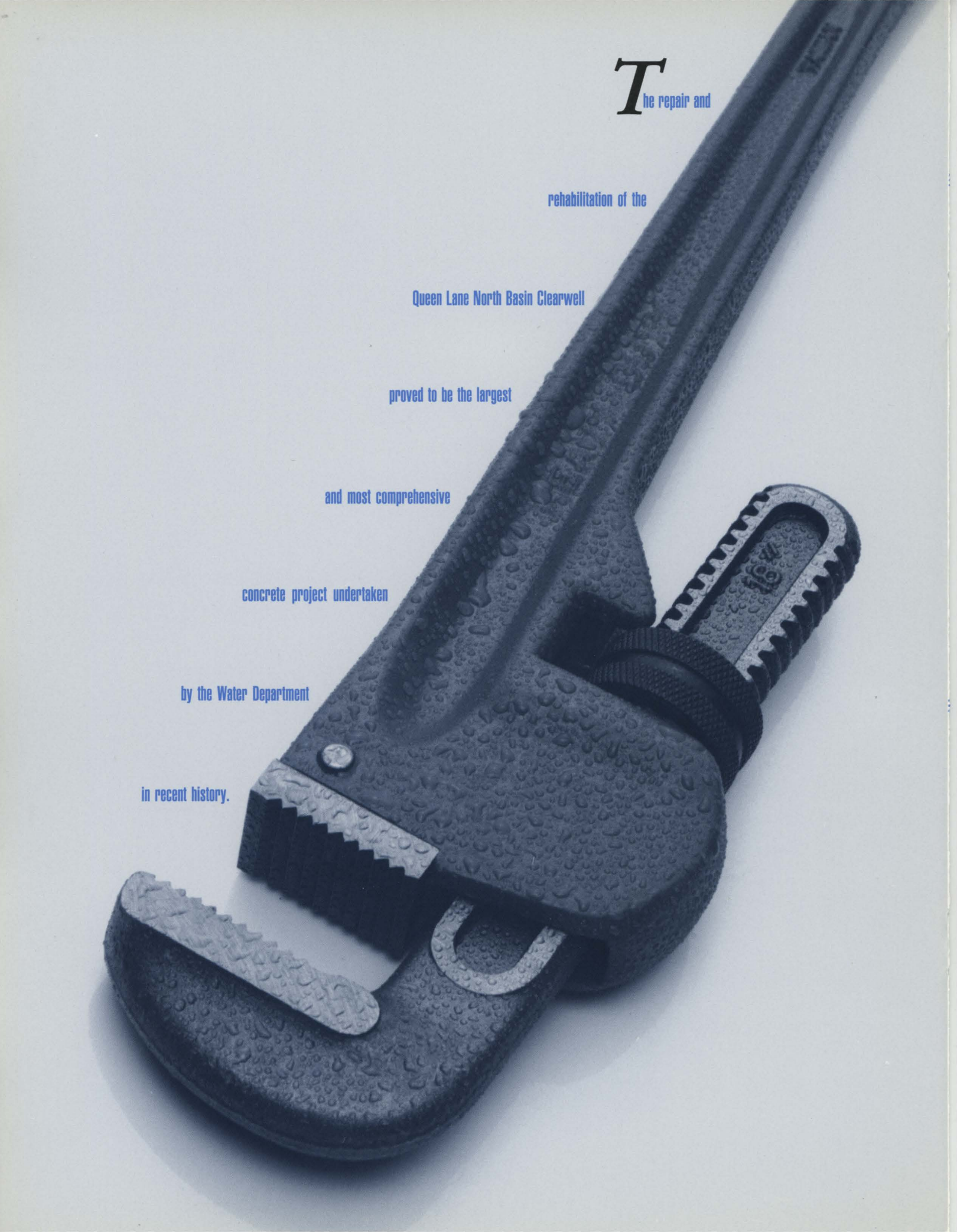
Cogeneration

Planning and Research is developing cogeneration facilities at the Department's Northeast and Southwest Water Pollution Control Plants. These facilities will utilize over 90 percent of the methane produced by the sludge digestion process as fuel to generate electricity and hot water to operate the plants. This highly efficient form of energy production will produce significant cost savings for the Department.

After the initial feasibility study concluded that cogeneration systems offered an economic advantage, the Water Department decided to move forward with their implementation. Modular internal combustion engines were selected as the preferred technology, producing between four and eight megawatts at each facility. These engines will burn sludge gas (methane) supplemented by natural gas from PGW. The excess thermal heat resulting from the generation of electricity will produce hot water for space heating and for heating the sludge gas digesters. All of the electricity produced by cogeneration will be exclusively used by the wastewater treatment facilities. The cogeneration facilities will meet all federal, state and local environmental and emissions requirements.

Various options were considered for financing the construction and operation of the cogeneration plants. In order to preserve Department capital resources and because institutional, financial and technological issues can be highly complex and require a broad range of expertise, the Department chose to seek a private developer to finance, design, build, own and operate these facilities.

Under the proposed business arrangements, the developer will invest approximately $15 million in the construction of cogeneration facilities, and will operate and maintain the facilities over a 20-year contract term. The electricity and thermal energy produced will be purchased by the Water Department at a discounted rate for use in the operation of the wastewater plants. In addition, digester gas, which is 60 percent natural gas, will be sold to the developer, thus providing the Department with an additional source of revenue. The Water Department anticipates savings of approximately $800,000 per year. With inflation, these savings should be equivalent to nearly $21 million over the length of the contract. The cogeneration system will also qualify the Water Department for $8 million of grants from the Environmental Protection Agency under their Innovative and Alternative grants program.



The repair and rehabilitation of the Queen Lane North Basin Clearwell proved to be the largest and most comprehensive concrete project undertaken by the Water Department in recent history.

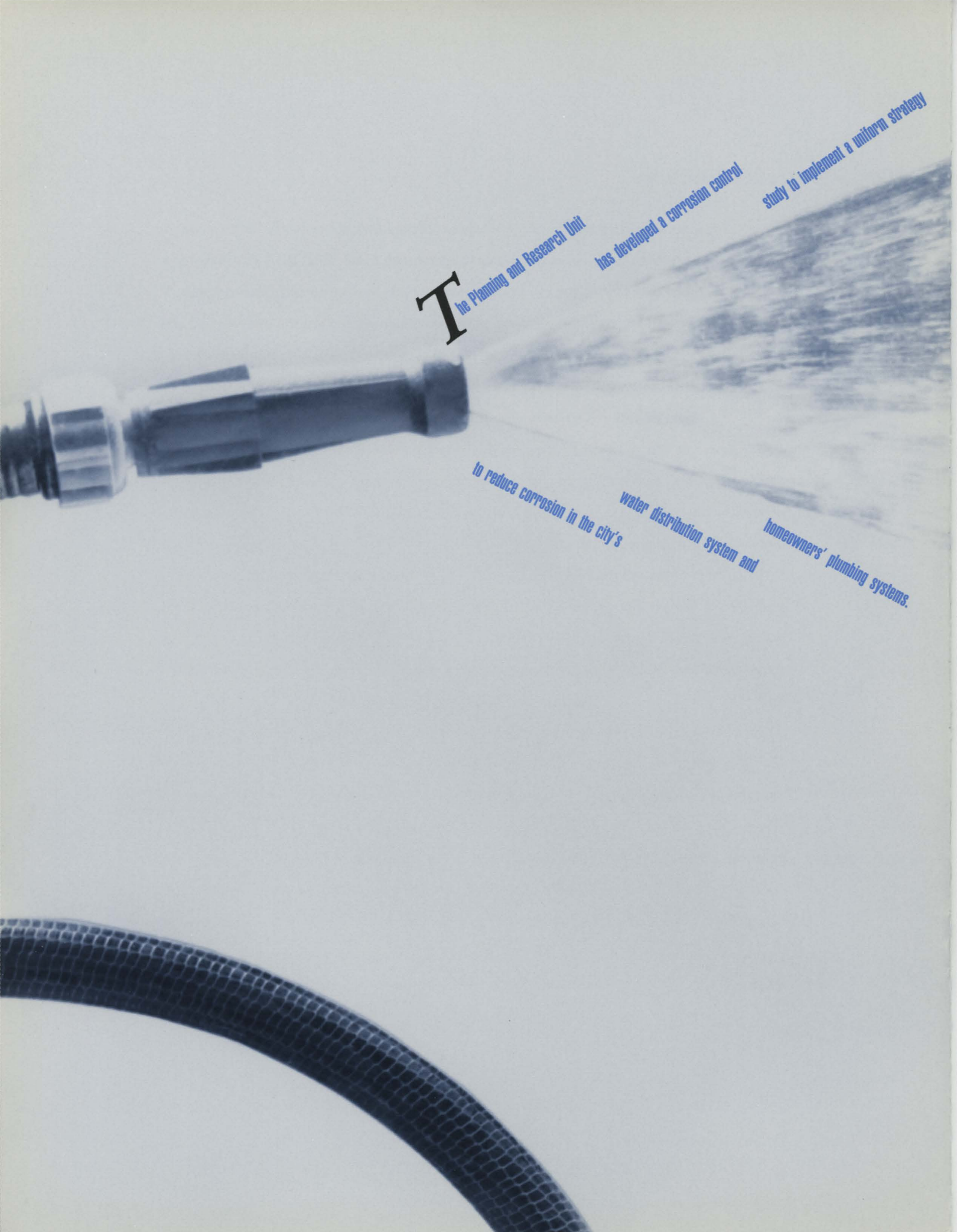
Facility Construction

Finished water is stored in two 45-million gallon covered clearwells which serve as water storage basins at the Queen Lane Water Treatment Plant. In Fiscal Year 1989, the repair and rehabilitation of the North Basin Clearwell proved to be the largest and most comprehensive concrete project undertaken by the Water Department in recent history, involving 16 bid items, including intrusion grouting and guniting repairs to beams, columns, supports, arches, walls and slabs. The clearwell is 1,056 feet by 345 feet in area and two stories deep.

Far more rehabilitation was required than originally expected due to extensive deterioration of the concrete. The Design Branch of the Water Department provided engineering services during the course of construction in unprecedented amounts than what is usual for a structural engineering project, e.g., shop drawings, change orders, etc. Approximately $2.8 million was spent.

Three of the four clarifiers at the Baxter Water Treatment Plant were rebuilt in Fiscal Year 1989. The clarifier equipment is made up of a flight and chain sludge collection system which skims the sludge that has settled on the bottom of the sedimentation tanks as it rotates about the center. Sludge is directed to a submerged pump which removes the sludge from the tank. The installation was unique for the Water Department as it involved the use of helicopters to deliver the rebuilt clarifier motors.

The Water Department's Load Control continued to oversee the maintenance and renewal activities of the water supply and transmission systems by authorizing and scheduling the outages of large diameter water mains, pumps, storage basins, reservoirs, tanks and water treatment plant facilities when their capacity was impacted. This required exemplary coordination with all units of Water Conveyance as well as the Treatment Section and the Design and Construction branches, the Bureau of Laboratory Services and the Planning and Engineering Division. The Large Valve Replacement Program included 40 large valve replacements or repairs for Fiscal Year 1989; up from 32 locations last year.


The Planning and Research Unit has developed a corrosion control study to implement a uniform strategy to reduce corrosion in the city's water distribution system and homeowners' plumbing systems.

Corrosion Control Study

The Water Department's Planning and Research Unit has developed a corrosion control study with the goal to implement a uniform strategy to reduce corrosion in the city's distribution system and homeowners' plumbing systems.

Seven pipe-racks which model the distribution and home plumbing system have been installed at various Department facilities to reflect the effectiveness of existing corrosion control procedures. The selected locations include assemblies at effluents of the three water treatment plants and at the farthest distribution point of each system, plus an additional assembly in the Fairmount section of Philadelphia, where the impact of mixing Delaware and Schuylkill water supplies can be evaluated. These locations provide optimum accessibility for quality control, data gathering and analysis of existing conditions.

The pipe-racks are constructed of PVC piping with metal coupon inserts of materials presently used in the distribution and home plumbing system, e.g., steel, lead, bronze and copper. The copper coupons are coated on one side with 60/40 lead/tin solder to reflect home plumbing materials. The overall effectiveness of the chemical inhibitors which the Department currently uses to minimize corrosion will be evaluated based upon a number of the Department's concerns including infrastructure protection, lead dissolution, water quality and costs, with standing water quality and coupon weight loss analyses providing the benchmarks for comparisons.

In the near future, a simultaneous study will begin which will examine the potential for reducing corrosion rates by using a variety of corrosion inhibitors and schemes as an alternative to existing practices. Initially, three alternative treatments will be evaluated at two water treatment facilities encompassing elevated pH, polyphosphate, and sodium silicate. Final results will be available next year.

Water and Wastewater Bonds

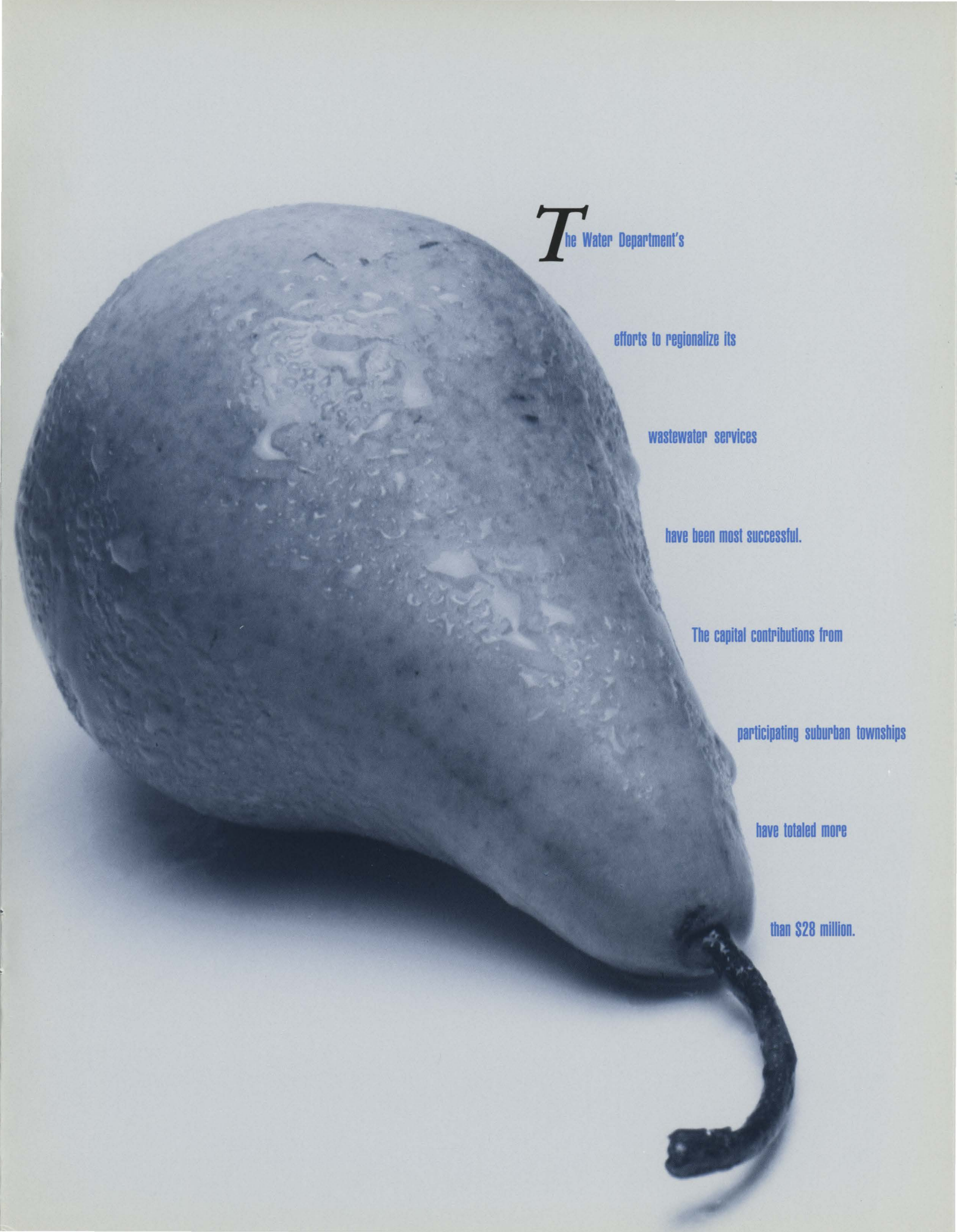
The Philadelphia Water Department marketed its 14th and 15th Series Water and Wastewater Bonds in May 1989. The proceeds of the 14th Series Bonds enabled the Department to finance its capital needs for the last half of calendar 1989 and all of calendar 1990, as $115 million was raised for the Capital Improvement Fund. This fund has been invested for approximately 18 months in projects designed to improve facilities for water and wastewater treatment, sewer systems, water and sewer pipes, pumping stations and related components of the operational system of the Water Department.

The 15th Series Bonds are the result of the refinancing of $135 million of the Department's Ninth Series Bonds at lower interest rates, which produced a subsequent reduction in Water Department debt service. The refinancing of the Ninth Series Bonds will save the Water Department $14 million over the next several years, thereby offsetting Department revenue requirements and saving the Department's ratepayers money.

Wholesale Customer Agreements

The Philadelphia Water Department has developed into a regional utility which services portions of the entire Delaware Valley region. Its water services some 500,000 retail customers in Philadelphia and provides wholesale water to residents in Lower Bucks County through an agreement with the Bucks County Water and Sewer Authority.

The Water Department's efforts to regionalize its wastewater services have been most successful. The Department's regional wastewater system service area encompasses 130 square miles in Philadelphia and 149 square miles in Bucks, Montgomery and Delaware counties. Ten wholesale agreements exist with these suburban customers. Over the past two years, Bucks County Water and Sewer Authority, Bensalem Township, Upper Darby Township and Lower Southampton have agreed to new 35-year contracts with the City of Philadelphia. Their capital contributions in recognition of these new agreements have totaled more than $28 million.



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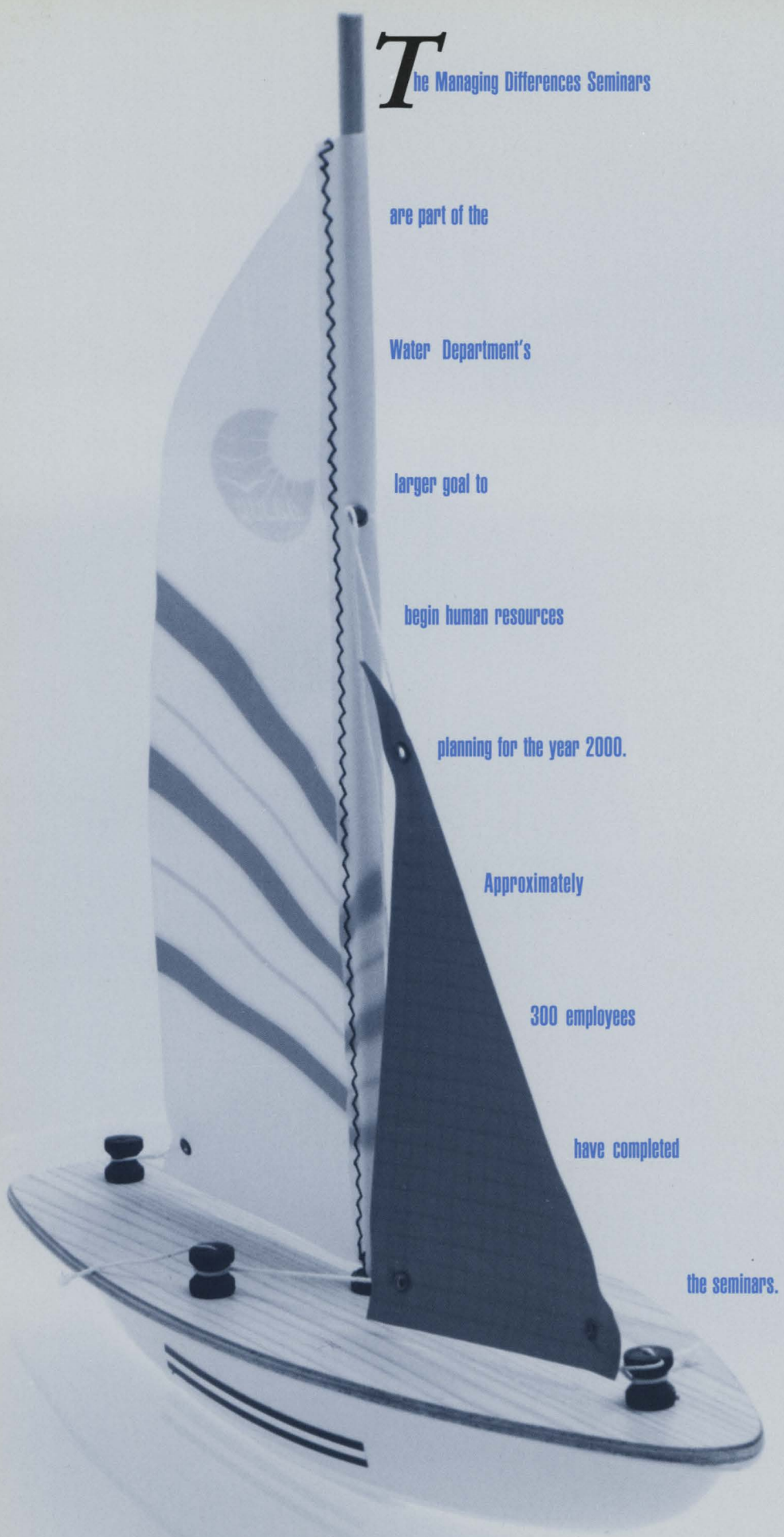

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Managing Differences Seminars

The Water Department's Administration and Human Resources Division coordinated the Managing Differences Seminars which consisted of workshops among a diverse representation of Department employees to openly discuss personal and work-related goals in addition to helping employees recognize the stereotypes they hold and the biased behaviors that can result within a diverse workforce. The Managing Differences Seminars are part of the Department's larger goal to begin human resource planning for the year 2000, by which time the white male population will be making up only 33 percent of the U.S. work force. As a result, management must alter its style of treating the individuals comprising its work force the same. With the majority of the work force composed by this time of women and minorities, management will be presented with a work force requiring a variety of modes of communication in response to cultural, racial and gender-related issues, major differences that cannot be ignored. Managers will be required to adapt to these differences to encourage efficiency.

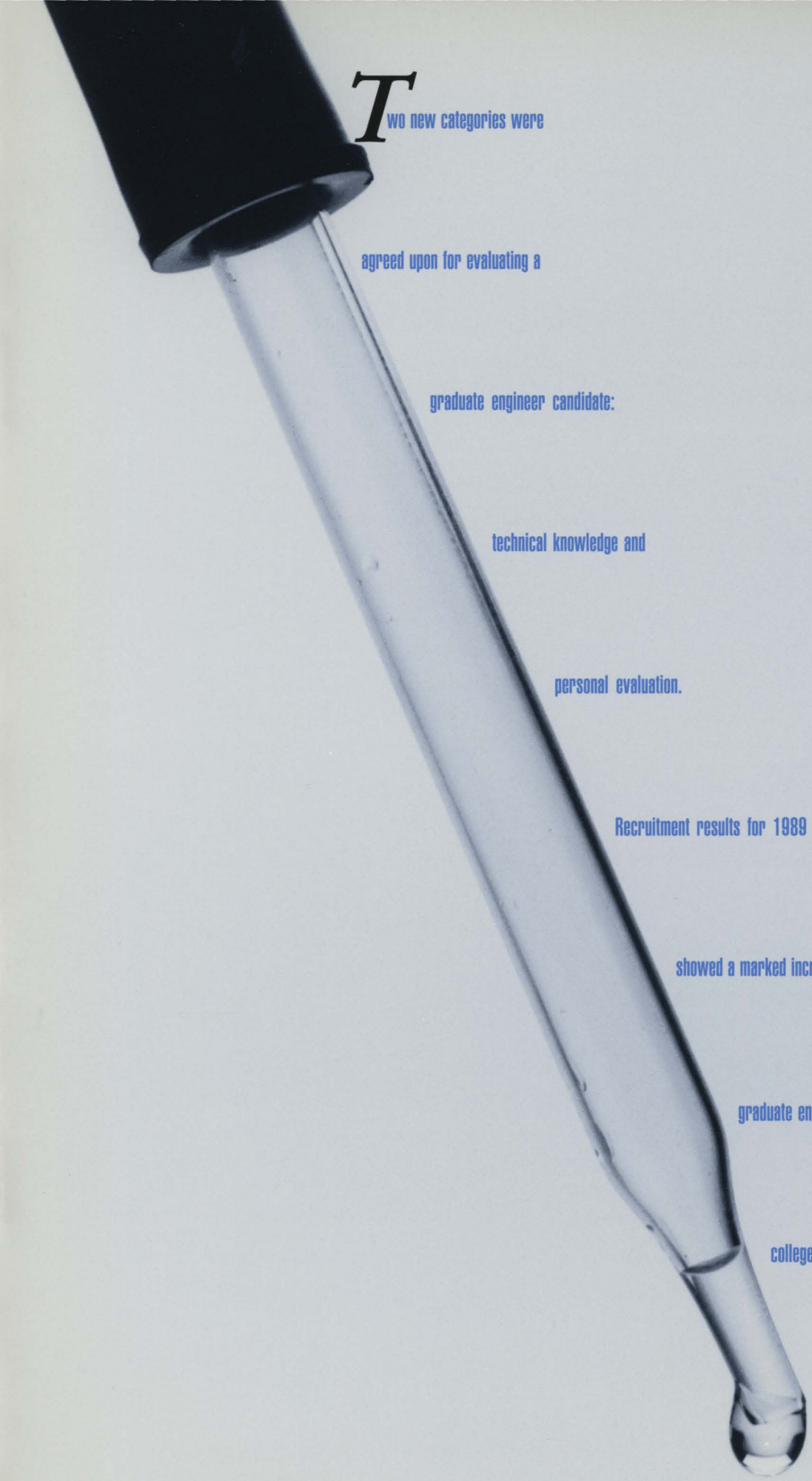
Approximately 300 Water Department employees from diverse work and cultural backgrounds have completed the seminars. Each seminar consisted of approximately 15 employees exchanging ideas and opinions under the guidance of a management consultant over a two-day period. The seminars were wrapped up with a concrete list of goals and suggestions for implementation, some of the more prominent including: a work atmosphere that appreciates and respects differences and thereby eliminates racism, sexism and discrimination; more opportunities for self-development and training; an administrative system sensitive to employees' personal concerns, e.g., childcare; and communication and respect among all employee levels including union and management.

Eighteen employees who attended the Managing Differences Workshops volunteered to serve on the subsequent Commissioner's Committee for Change. This committee has been charged with identifying and developing recommendations to address some of the major human resources challenges emphasized by the Managing Differences Workshops and other issues affecting human resources development brought to the front by the committee members themselves. The Committee will be in periodic contact with their fellow employees for additional suggestions and progress reports.

Graduate Engineer Recruitment

Administration and Human Resources evaluated and revised the Graduate Engineer recruitment strategy in response to requests made by the Water Department's operating and research units. Previous testing and interviews conducted with interested candidates relied heavily upon training and experience, effectively eliminating a large percentage of young engineering graduates due to their lack of experience. Under new guidelines agreed upon by Water Department engineering managers and representatives from the Streets and Health departments, two new categories were set for evaluating a graduate engineer: technical knowledge and personal evaluation. Within the personal evaluation category, the committee determined that sound judgement and the ability to communicate are the most important factors and that, overall, personal evaluation is more important than technical knowledge. The testing emphasis was therefore set at 60 percent personal evaluation and 40 percent technical knowledge. Technical knowledge evaluated includes knowledge of computers, report writing, sound judgement, the ability to analyze a situation and develop a consistent response, and knowledge of hydraulics.

Recruitment results for 1989 showed a marked increase in graduate engineers from local colleges and universities passing the Department's revised testing procedure. The Department hopes to step up its recruitment efforts this coming year following the same recruitment strategies with special emphasis placed upon the recruitment of civil engineers.



Two new categories were agreed upon for evaluating a graduate engineer candidate: technical knowledge and personal evaluation.

Recruitment results for 1989 showed a marked increase in graduate engineers from local colleges and universities.

Supplemental Schedule of Rate Covenant Compliance for the Fiscal Year Ended June 30, 1989 (Legally Enacted Basis)

Pursuant to Section 4.03(b) of the General Water and Sewer Revenue Bond Ordinance of 1974 (Bill No. 1263), the City is required to impose, charge and collect in each Fiscal Year rates and charges at least sufficient, together with that portion of the unencumbered amount of the operating funds balances available and reserved for appropriation for the payment of Operating Expenses at the commencement of such Fiscal Year, which together with all other project revenues to be received in such Fiscal Year, shall equal not less than the greater of:

A. The sum of
(i) Net Operating Expenses payable during such Fiscal Year;
(ii) 150% of the amount required to pay the principal of and interest on all Bonds issued and outstanding hereunder which will become due and payable during such Fiscal Year; and
(iii) the amount, if any, required to be paid into the Sinking Fund Reserve during such Fiscal Year; or

B. The sum of:
(i) all Operating Expenses payable during such Fiscal Year; and
(ii) all Sinking Fund deposits required during such Fiscal Year in respect of all outstanding Bonds and in respect of all outstanding general obligation bonds issued for improvements to the water or sewer systems and all amounts, if any, required during such Fiscal Year to be paid into the Sinking Fund Reserve.

Coverage is computed as follows:

Coverage A

	Line 4	111,842,038
+	Line 11	12,470,144
+	Line 18	48,078,255
		172,390,437
/	Line 5	86,729,674
=	Coverage A	1.99

Coverage B

	Line 4	111,842,038
+	Line 11	12,470,144
-	Line 12	(35,734,877)
+	Line 18	48,078,255
		136,655,560
/	Line 7	101,977,310
=	Coverage B	1.34

Supplemental Schedule of Rate Covenant Compliance for the Fiscal Year Ended June 30, 1989 (Legally Enacted Basis)

Line No.		
1.	Total Operating Revenue	$ 260,360,686
2.	Net Operating Expense	(138,248,432)
3.	Bond Anticipation Notes	(10,270,216)
4.	Net Operating Revenue after Notes	111,842,038
Debt Service:		
5.	Revenue Bonds Outstanding	86,729,674
6.	General Obligation Bonds Outstanding	15,247,636
7.	Total Debt Service on Bonds	101,977,310
8.	Net Operating Revenue after Bonds	9,864,728
Nonoperating Income:		
9.	Interest Income	7,248,826
10.	Grant Income	5,221,318
11.	Total Nonoperating Income	12,470,144
Other Obligations:		
12.	Direct Interdepartmental Charges	(35,734,877)
13.	Transfer of Interest Income to General Fund	(1,984,682)
14.	Renewal and Replacement Fund Transfers	(4,327,341)
15.	Renewal and Replacement Project Expenditures	(7,397,786)
16.	Total Other Obligations	(49,444,686)
17.	Net Operating Balance for Current Year	(27,109,814)
18.	Net Balance at Beginning of Fiscal Year	48,078,255
19.	Net Balance at End of Fiscal Year	$ 20,968,441

Property, Plant and Equipment

Property, plant and equipment at June 30, 1988 and 1989, consisted of the following:

	Fiscal Years Ended	
	June 30, 1988	**June 30, 1989**
Land	$ 5,919,160	$ 5,919,160
Buildings and related improvements	886,369,158	903,927,937
Equipment	38,960,722	40,076,652
Transmission and distribution lines	981,750,241	999,921,370
Construction in progress	106,319,853	130,815,838
Total Less accumulated depreciation	(614,092,280)	(653,182,460)
Total	$ 1,405,226,854	$ 1,427,478,497

Philadelphia Water Department

ARA Tower at Reading Center

1101 Market Street

Philadelphia, PA 19107