

preserving streams, ponds and other wetland areas and allowing them to perform their natural functions of conveying, storing and filtering storm water. A typical Bluebelt corridor includes man-made detention ponds, restored stream beds and constructed wetlands. This work is done with minimal disturbance to the natural environment and includes extensive restoration and beautification, including the planting of native species of trees, flowers and shrubs.

Bluebelt systems are currently under development in 16 watersheds on the South Shore of Staten Island. The existing Bluebelt corridors serve the storm water drainage needs of almost half of the borough and have already saved the City over \$80 million in conventional sewer construction costs.

The extensive Bluebelt work on the South Shore will soon be joined by new developments in the mid-Island part of Staten Island. Mayor Michael Bloomberg announced the first step in that development in August 2003: the initiation of wetland property acquisition for the creation of the New Creek Bluebelt. The New Creek system will serve a 2,000 acre watershed, relieving flooding and restoring wetlands for the neighborhoods of Midland Beach, Dongan Hills, Grant City and Todt Hill.

Service Improvements Through Technology

DEP is also committed to implementing emerging technologies to better operate, maintain and enhance the City's water and sewer systems. These new technologies enable us to provide cost-effective means to implement service improvements for the system's 8 million users. Two examples of this are the development of a Geographic Information System (GIS) mapping capability for both the water and sewer systems and the advancement of trenchless technology. GIS technology will allow for the mapping of the water distribution and sewer collection systems in a digital format, which can then be linked to the agency's work order system. When this project is complete, DEP will be able to track complaints graphically, improve the scheduling and productivity of work crews, and accelerate the planning of capital upgrade and expansion work. Trenchless technology is the application of epoxy or resin inside an existing water or sewer main. This process rehabilitates the main at a significantly reduced cost and enables DEP or DDC to perform repair work without extensive street trenching.



Water Quality Monitoring



Drinking Water Quality Control Distribution Laboratory - Organics

Water Supply Protection

Regulation of Drinking Water

In order to ensure that tap water is safe to drink, the New York State Department of Health (NYSDOH) and EPA prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. Sources of drinking water worldwide (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals, and in some cases radioactive material, and can pick up substances resulting from the presence of animals or from human activities. Contaminants that may be present in source water include: microbial contaminants, inorganic contaminants, pesticides and herbicides, organic chemical contaminants, and radioactive contaminants.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline at (800) 426-4791.

What People Are Saying About DEP

"As a member of Manhattan Community Board 8, I attended the Borough Consultations. I mentioned the ongoing concern in the East 60's about two malfunctioning storm drains. Imagine my surprise the next morning to see DEP investigating the problem and preparing to repair it. I would like to thank DEP for their dedication and prompt response."

*Judith E. Schneider,
Executive Vice President
East Sixties Neighborhood
Association, Inc., Manhattan.*



Drinking Water Quality Control Limnological Monitoring

Watershed Protection

During 2003, New York City continued to implement its comprehensive watershed protection program, which began in 1997. This effort focuses on several key areas: land acquisition and management (includes \$25 million in new fundings for land acquisition in the Croton system); improved security for water supply infrastructure; and partnership programs, such as Stream Management and the Watershed Agricultural Program, which address specific sources of pollution. DEP also conducted additional water quality research, continued to fund and oversee the upgrading of all non-City-owned wastewater treatment plants in the watershed and completed more projects in its watershed infrastructure rebuilding program. These initiatives have enabled the City to retain Filtration Avoidance status from the EPA for the Catskill/Delaware system. More information on this Program can be found on DEP's web site at www.nyc.gov/dep/watershed.

Treatment Technologies

Catskill/Delaware UV Facility

EPA is proposing to adopt new regulations in 2005, specifically the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), to improve control of microbial pathogens. In preparation for the new rule, New York City has begun design of an ultraviolet plant for the Catskill/Delaware system; when built, this plant will provide an additional barrier of microbiological protection by inactivating potentially harmful organisms such as *Cryptosporidium* or *Giardia*. This treatment will supplement DEP's existing microbial disinfection programs.

What People Are Saying About DEP

"I have worked with DEP for several years on the Brooklyn Queens Aquifer Citizens Advisory Committee. DEP does a Herculean task of reaching out to the communities. DEP is responsive and is doing a tremendous job for New Yorkers."

Manny Caughman of Queens.

Croton Filtration Plant

The City wishes to ensure that Croton system water is at all times protected against microbiological contamination, is aesthetically pleasing, and meets all drinking water quality standards. To that end and after careful study, the City has concluded that measures beyond watershed protection are necessary to address various water quality issues and help ensure that the Croton system remains a dependable source of safe drinking water. The City is therefore proceeding with the design and construction of a filtration plant for Croton system water, pursuant to the terms of a November 1998 federal court Consent Decree, entered into with the United States and the State of New York. The filtration facility is expected to reduce color levels in water from the Croton system, reduce the risk of microbiological contamination, reduce disinfection by-product levels, and ensure compliance with stricter water quality standards.

The Consent Decree, as modified in May 2002, requires the City to evaluate and choose between three potential sites for the filtration plant: two in the Bronx, at the Mosholu Golf Course or along the Harlem River in the vicinity of Fordham Road, and one at Eastview in Westchester County. The Final Supplemental Environmental Impact Statement reviewing these three sites will be released by June 30, 2004, at which time a preferred site for the facility will be announced. The plant is expected to be in operation by 2010 or 2011, depending on which site is selected for construction. Regardless of where the filtration plant is built, the City remains committed to maintaining a comprehensive watershed protection program for the Croton system.

Until DEP begins to filter Croton water, we are required to make the following statement: *Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites, which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.*

Water Treatment

All surface water and groundwater entering New York City's distribution system is treated with chlorine, fluoride, orthophosphate, and, in some cases, sodium hydroxide. New York City uses chlorine to meet the New York State Sanitary Code and federal Safe Drinking Water Act disinfection requirements. Fluoride, at a concentration of one part per million, is added to help prevent tooth decay and has been added since 1966 in accordance with the New York City Health Code. Orthophosphate is added to create a protective film on pipes that reduces the release of metals such as lead from household plumbing. Sodium hydroxide is added to Catskill/Delaware water to raise the pH and reduce corrosivity. A sequestering phosphate is applied at several groundwater wells to prevent the precipitation of naturally occurring minerals, mostly iron and man-

ganese, in the distribution mains and customers' household piping. Air stripper facilities operate at several wells to remove volatile organic chemicals. And, as mentioned above, granular activated carbon filters were tested for two-week periods at four wells in Southeast Queens in 2003.



Drinking Water Quality Control Distribution Laboratory - Electron Microscopy

Drinking Water Quality

DEP's water quality monitoring program - far more extensive than required by law - demonstrates that the quality of New York City's drinking water remains high and meets all health-related State and federal drinking water standards except for haloacetic acids (HAA5) in the Croton System. In May and December 2003, the Croton system violated the maximum contaminant level (MCL) for the group of disinfection by-products called haloacetic acids (HAA5) of 60 ug/L computed as an annual quarterly running average. Haloacetic acids are a group of chemicals that includes mono-, di- and trichloroacetic acids and mono- and dibromoacetic acids. Haloacetic acids are formed in drinking water during treatment by chlorine, which reacts with certain acids that are in naturally-occurring organic material (e.g., decomposing vegetation such as tree leaves, algae or other aquatic plants) in surface water sources such as rivers and lakes. The amount of haloacetic acids in drinking water can change from day to day, depending on the temperature, the amount of organic material in the water, the amount of chlorine added, and a variety of other factors. Drinking water is disinfected by public water suppliers to kill bacteria and viruses that could cause serious illnesses. Chlorine is the most commonly used disinfectant in New York State. For this reason, disinfection of drinking water by chlorination is beneficial to public health.

New York State requires the following statement: *Some studies of people who drank chlorinated drinking water for*

20 to 30 years show that long term exposure to disinfection by-products (possibly including haloacetic acids) is associated with an increased risk for certain types of cancer. However, how long and how frequently people actually drank the water as well as how much haloacetic acids the water contained is not known for certain. Therefore, we do not know for sure if the observed increased risk for cancer is due to haloacetic acids, other disinfection by-products, or some other factors. The individual haloacetic acids dichloroacetic acid and trichloroacetic acid cause cancer in laboratory animals exposed to high levels over their lifetimes. Dichloroacetic acid and trichloroacetic acid are also known to cause other effects in laboratory animals after high levels of exposure, primarily on the liver, kidney and nervous system and on their ability to bear healthy offspring. Chemicals that cause effects in animals after high levels of exposure may pose a risk to humans exposed to similar or lower levels over long periods of time.

Drinking Water Monitoring

DEP's Bureau of Water Supply (BWS) is responsible for monitoring water quality throughout the distribution system, the upstate reservoirs and feeder streams, and the groundwater wells in Southeast Queens. Water quality is monitored continuously as the water enters the distribution system, and is tested regularly at sampling points throughout the entire City. DEP conducts analyses for a broad spectrum of microbiological, chemical, and physical measures of quality. In 2003, more than 36,900 samples were collected from the City's distribution system; approximately 415,500 analyses were performed on these samples.

DEP conducts most of its distribution water quality monitoring at approximately 1000 fixed sampling stations throughout the City. These stations, which you may have seen in your neighborhood, allow samples to be collected throughout the distribution system in an efficient and sanitary manner.



Drinking Water Sample Collection at Sampling Station



Drinking Water Quality Control Distribution Laboratory - Metals Analysis

Test Results

The results of the tests conducted in 2003 on distribution water samples under the Distribution System Monitoring Program are summarized in the tables in this Report. These tables reflect the compliance monitoring results for all regulated and unregulated parameters. The tables present the federal and State standard for each parameter (if applicable), the number of samples collected, the range of values detected, the average of the values detected, and EPA's suggested possible sources of the parameters. The monitoring frequency of each parameter varies and is parameter specific. Data are presented separately for the Catskill/Delaware, Croton, and Groundwater Systems. Whether a particular user receives water from the Catskill/Delaware, Croton, or Groundwater supplies, or a mixture, depends on location, system operations, and consumer demand. Those parameters monitored but not detected in any sample are presented in a separate box.

The State requires monitoring for some parameters less than once per year because the concentrations of these parameters do not change frequently. Accordingly,

some of these data, though representative, are more than one year old. In 2003, DEP conducted monitoring of certain parameters as required under the federal Unregulated Contaminants Monitoring Rule (UCMR). Those results are presented in a separate box. Unregulated parameter monitoring is a national program conducted to help EPA determine where certain parameters occur and whether it needs to regulate those parameters.

What People Are Saying About DEP

"DEP personnel responded to our request to clear clogged catch basins in preparation for the Millennium celebrations, thus assuring that hundreds of thousands of guests would not have to wade through flooded or icy crosswalks during the Holiday Season. DEP civil servants of this caliber are the foundation of our great city and we want to acknowledge their contributions."

*Shari Doloboff, Senior Consultant
Times Square Business
Improvement District, Manhattan.*

Lead in Drinking Water

New York City water is virtually lead-free when it is delivered from the City's upstate reservoir system, but water can absorb lead from solder, fixtures, and pipes found in the plumbing of some buildings or homes. Mandated at-the-tap lead monitoring is conducted at a set number of households located throughout the City. Based on the results of this monitoring, in 2003, the 90th percentile did not exceed 15 µg/L. Therefore, New York City has met the established standard, or Lead Action Level (AL). The at-the-tap monitoring results are also presented in a separate table.

It is possible that lead levels in your home may be higher than other homes in the community as a result of materials used in your home's plumbing. If you are concerned about elevated lead levels in your home's water, you may wish to have your water tested. To request a free kit to test for lead in your drinking water, call the City of New York's 24-hour Help-line at 311 or (212) NEW-YORK. Additional information is available from the EPA's Safe Drinking Water Hotline at (800) 426-4791.

Monitoring for *Cryptosporidium* and *Giardia*

In 1992, the City started a comprehensive program to monitor its source waters and watersheds for the presence of *Cryptosporidium* and *Giardia*. Since then, samples have been collected weekly from the outflows of the Kensico and New Croton Reservoirs, before water is first chlorinated in the Catskill/Delaware and Croton Systems, respectively. Since 1992, DEP has modified its laboratory protocols twice to improve the Department's ability to detect both *Giardia* cysts and *Cryptosporidium* oocysts. These test methods, however, are limited in that they do not allow us to determine if organisms identified are dead or capable of causing disease.



Drinking Water Quality Control Distribution Laboratory - Microscopy



Drinking Water Quality Control Distribution Laboratory - Microbiology

In 2003, a total of 141 samples of Kensico Reservoir effluent and 59 samples of New Croton Reservoir effluent were collected and analyzed for *Giardia* cysts and *Cryptosporidium* oocysts using Method 1623 HV. Of the 141 Kensico Reservoir samples, 109 were positive for *Giardia* and 41 were positive for *Cryptosporidium*. Of the 59 New Croton Reservoir samples, 30 were positive for *Giardia* and 7 were positive for *Cryptosporidium*. DEP's *Giardia* and *Cryptosporidium* data from 1992 to the present, along with weekly updates, can be viewed on our web site at www.nyc.gov/html/dep/html/pathogen.html. As mentioned, detecting the presence of *Giardia* cysts and *Cryptosporidium* oocysts does not indicate whether these organisms are dead or potentially infectious.

While there is no evidence of illness related to the New York City water supply, federal and New York State law requires all water suppliers to notify their customers about the potential risks of *Cryptosporidium* and *Giardia*. Cryptosporidiosis and giardiasis are intestinal illnesses caused by microscopic pathogens, which can be waterborne. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Most healthy individuals can overcome both of these diseases within a few weeks. DEP's Waterborne Disease Risk Assessment Program conducts active surveillance for giardiasis and cryptosporidiosis to track the incidence of illness and determine all possible causes, including tap water consumption. No giardiasis or cryptosporidiosis outbreaks have been attributed to tap water consumption in New York City.

According to the EPA and the Centers for Disease Control and Prevention (CDC), it is unclear how most cases of cryptosporidiosis or giardiasis in the United States are contracted. The relative importance of various risk factors is unknown. Risk factors include eating con-

aminated food, swallowing contaminated recreational water while swimming or camping, contact with animals, contact with human waste, certain sexual practices, and drinking contaminated water. Individuals who think they may have cryptosporidiosis or giardiasis should contact their health care provider.

Some people may be more vulnerable to disease-causing microorganisms or pathogens in drinking water than the general population. Immuno-compromised persons, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with Crohn's disease or HIV/AIDS or other immune system disorders, some elderly, and infants, can be particularly at risk from infections. These people should seek advice from their health care providers about their drinking water.

EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium*, *Giardia* and other microbial contaminants are available from the EPA's Safe Drinking Water Hotline at (800) 426-4791.

Water Conservation

The average single family household in New York City uses approximately 100,000 gallons of water each year, at a cost of \$1.52 per 100 cubic feet of water (748 gallons), or about \$203.00 each year. New York City is fortunate to have reasonably priced drinking water; however, everyone should do their part to conserve this precious resource. All New Yorkers are encouraged to observe good water conservation habits, and are required to obey the City's year-round water use restrictions, which include a prohibition on watering sidewalks and lawns between November 1 and March 31, and on watering lawns and sidewalks from April 1 to October 31 between the hours of 11 AM and 7 PM. It is illegal to open fire hydrants at any time. Additionally, you can help save water by ordering a Home or Apartment Water Saving Kit by calling 311. If you are an apartment building owner/manager or a homeowner, you can obtain a free leak survey. Call DEP's Leak Survey contractor at (718) 326-9426 for information.

What People Are Saying About DEP

"In making inquiries about a construction project near my residence, DEP staff made me feel very confident that my inquiry was not insignificant and would do their best to provide me with some direction. I serve in a management capacity and realize that great customer service skills are essential to any business environment. It is my opinion that DEP went beyond the call to satisfy the need of a customer."

Angela Mahon of Brooklyn.