

NEW YORK CITY WATER SUPPLY SYSTEM

2014

SANITARY SURVEY ANNUAL REPORT



**BUREAU OF ENVIRONMENTAL SCIENCES & ENGINEERING
OFFICE OF PUBLIC HEALTH ENGINEERING**

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LIST OF ABBREVIATIONS

| | |
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| 10NYCRR | New York State Sanitary Code |
| 40CFR | Code of Federal Regulations: Protection of the Environment |
| ADM | Antidiarrheal Medicine |
| BCD | Bureau of Communicable Disease |
| CAT | Catskill Water Supply System |
| CATUEC | Upper Effluent Chamber |
| CCCP | Cross Connection Control Program |
| CDC | Center for Disease Control |
| CRO | Croton Water Supply System |
| CT | Contact Time |
| CWTP | Croton Water Treatment Plant |
| DEL | Delaware Water Supply System |
| DEP | New York City Department of Environmental Protection |
| DOHMH | New York City Department of Health and Mental Hygiene |
| EHM | Environmental Health Manual |
| EHS | Environmental Health & Safety |
| ELAP | Environmental Laboratory Approval Program |
| EPA | United States Environmental Protection Agency |
| FAD | Filtration Avoidance Determination |
| LCR | Lead and Copper Rule |
| LPPP | Lead Poisoning and Prevention Program |
| LT2 | Long Term 2 Enhanced Surface Water Treatment Rule |
| MGD | Million Gallons per Day |
| NCA | New Croton Aqueduct |
| NYC | New York City |
| NYCDOHMH | New York City Department of Health and Mental Hygiene |
| NYSDOH | New York State Department of Health |
| OTC | Over the Counter Medicine |
| PHE | Office of Public Health Engineering within NYCDOHMH |
| PLC | Programmable Logic Control |
| RWBT | Rondout-West Branch Tunnel |
| SOP | Standard Operating Procedures |
| SWTR | Surface Water Treatment Rule |
| TCR | Total Coliform Rule |
| UV | Ultraviolet Treatment |
| WDRAP | Waterborne Disease Risk Assessment Program |
| WQMS | Water Quality Monitoring Station |

Figure 1: NYC Water Supply System



Source: NYC DEP Drinking Water Supply and Quality Report, 2014

1 INTRODUCTION

A sanitary survey for all public water systems using surface water or groundwater as a drinking water source is required by the United States Environmental Protection Agency's (EPA) Interim Enhanced Surface Water Treatment Rule (IESWTR), Ground Water Rule (GWR) and Total Coliform Rule (TCR), and the New York State Sanitary Code (10NYCRR).

The purpose is to establish if the water supply system's facilities, equipment, treatment, storage, operation, maintenance, and management are effective in producing safe, satisfactory drinking water, and if the system is in compliance with the following Federal, State and Local drinking water regulations:

- Surface Water Treatment Rule (40CFR Part 141 and 142 including the Interim Enhanced, Long Term 1, Long Term 2, Total Coliform Rule, Disinfectant/Disinfection Byproduct Rule (Stage 1 and 2), Lead and Copper Rule, Public Notification and the Filtration Avoidance Determination (FAD)).
- New York State Sanitary Code (10NYCRR); Part 5 Drinking Water Supply; and
- New York City Health Code; Article 141.

The EPA Sanitary Survey Guidelines and the New York State Department of Health (NYSDOH) Environmental Health Manual (EHM) (PWS 180 & 184), provide technical guidance as to what must be included in the sanitary survey and appropriate reporting time limits. In accordance with the EPA guidelines, the scope of the field sanitary surveys should address the following eight elements:

- Source
- Distribution
- Water Treatment
- Finished Water Storage
- Pumps and Controls
- Monitoring, Reporting and Data Verification
- Water System Management and Operations
- Water Treatment Operator Compliance

The elements of the scope are addressed where applicable within each major component under NYCDOHMH surveillance. Due to the size, complexity, and large geographic area of the NYC Water Supply System, regulatory oversight is split between NYCDOHMH and the NYSDOH.

In 2014, NYSDOH was the primary regulatory agency overseeing the field inspections for the Catskill and Delaware Source Water Systems north of the entry points in Tunnel 1, 2 and 3, which is under a Filtration Avoidance Determination (FAD). NYCDOHMH was the primary regulatory agency overseeing the field inspections for the offline Croton Source Water System, NYC Groundwater System and components in the Distribution System.

1.1 OVERSIGHT OF CAT/DEL WATER SUPPLY & DISTRIBUTION SYSTEM

In 1989, EPA's Surface Water Treatment Rule (SWTR) required filtration for all public water systems supplied by surface water. EPA and NYSDOH, however, memorialized in the 2007 Filtration Avoidance Determination (FAD) that the Catskill and Delaware water supplies met the requirements of the SWTR and IESWTR for unfiltered water supply systems due to the long-term watershed protection program. The SWTR requirements are codified in 40 CFR §141.71 and §141.72 and IESWTR in 40 CFR §141.171. To maintain the FAD, source water quality conditions must meet stringent fecal, total coliform

concentration and turbidity level requirements. A rigorous watershed control program, likely to minimize contamination by *Cryptosporidium* and *Giardia*, must be in place; such a program characterizes watershed hydrology and land ownership, as well as identifies and monitors watershed characteristics and activities which may have an adverse effect on source water quality. Site-specific conditions that must be met include disinfection and Contact Time (CT) requirements, redundant disinfection components, auxiliary power supply requirements and residual disinfectant addition at entry points. Sites must not be identified as the source of a waterborne disease outbreak, complying with the maximum contaminant level for total coliforms for 11 of the 12 previous months. Disinfection byproduct concentrations are also subject to strict requirements. Sites under these FAD rules are subject to annual on-site inspections.

The Revised 2007 FAD was released in 2014. It included several modifications in the general program requirements in addition to changes and enhancements to the following programs: (a) community wastewater and stormwater management, (b) land acquisition and management, (c) watershed agricultural and forestry use, (d) stream management and wetlands protection, (e) East-of-Hudson nonpoint source pollution control and (f) Catskill turbidity control.

EPA granted NYSDOH primary regulatory responsibility for the SWTR as it relates to the Catskill and Delaware water supply systems, which involves inspecting sites, evaluating programs and reviewing reports and certifications of compliance. As NYSDOH inspection sites often overlap with annual NYCDOHMH sanitary survey inspections, NYCDOHMH inspection visits are intended to occur concurrently with those by NYSDOH when possible with additional follow-up as necessary.

1.2 OVERSIGHT OF CROTON WATER SUPPLY & GROUNDWATER SYSTEM

The annual NYCDOHMH inspections evaluate the existing water storage, water conveyance equipment, water treatment equipment, devices for monitoring and recording devices, and operations and maintenance activities associated with these facilities. These inspections aim to ensure the systems' compliance with Local, State and Federal drinking water regulations.

1.3 ONGOING SURVEILLANCE ACTIVITIES

In addition to oversight of the water supply system, NYCDOHMH conducts ongoing surveillance of the NYC water supply through tap water sampling, health complaint response, cross-connection control program review, lead and copper program review, waterborne disease surveillance, monthly and annual DEP water quality report review, water treatment operator certification, and ongoing project review and monitoring. These activities allow NYCDOHMH to evaluate the system management's ability to produce safe drinking water and protect the water supply system from contamination.

1.4 REPORT ORGANIZATION

The annual report provides an executive summary overview of the onsite field surveys conducted by NYCDOHMH and the ongoing monitoring and surveillance activities for the year 2014.

Field Surveys

Representatives of NYCDOHMH conducted field surveys of 27 major system components including the Catskill Watershed; Ashokan and Rondout Reservoirs; Catskill and Delaware Aqueducts; Kensico, Hillview and Silver Lake Reservoir Systems; Croton Falls, Cross River and Croton Lake Reservoir System and New Croton Aqueduct Chambers; In-City Tunnels 1, 2, and 3 (phase 1 and phase 2, Manhattan leg), Richmond Tunnel and Staten Island Siphon; City Island, Shaft #8B, Richmond, Floyd Bennett Field and Breezy Point Booster Chlorination facilities; the Manhattan/Bronx, Queens/Brooklyn, and Staten Island

Distribution Pumping Station Districts; and the NYC Groundwater System. This section is intended to give a broad overview of the scope of activities and summary of findings.

Ongoing Monitoring and Surveillance

The purpose of the drinking water monitoring and surveillance programs is to evaluate the water quality of the NYC drinking water distribution system, address immediate issues, review compliance with the Federal, State and Local regulations, work proactively with other agencies to prevent contamination, and ultimately protect public health. These activities include the routine sampling of drinking water at end-use locations throughout the distribution system. Sampling program results are recorded in a database, analyzed and reviewed for compliance. Other surveillance and review programs detailed within this report include Water Quality Complaint Response and Record Keeping; Water Quality Report review; Water Treatment Operator Certification review; Ongoing Project review; Cross Connection Control review; Lead & Copper Rule review; and Waterborne Disease Surveillance review.

2 FIELD SURVEYS

2.1 CATSKILL/DELAWARE WATER SYSTEM

In 2014, 100% of the source water for the NYC Water Supply System was drawn from the Catskill (CAT) and Delaware (DEL) Water Supply Systems located in upstate New York. On average, the DEL System supplies about 60% of the daily demand of approximately 1 billion gallons a day and the CAT System provides the remainder. The approximate amount from each of these sources varied throughout the year in order to maintain the appropriate volume and quality in the distribution system. The Croton System (CRO) and the NYC Groundwater System were offline for 2014 and not fed into the distribution system.

The Catskill and Delaware watershed area encompasses all, or parts of, Delaware, Greene, Schoharie, Sullivan, and Ulster counties, west of the Hudson River. In 2014, waters from the CAT and DEL watershed were mixed at Kensico Reservoir and therefore frequently referred to as one system downstream of Kensico: the CAT/DEL system.

The CAT System consists of 2 reservoirs, Schoharie and Ashokan, located west of the Hudson River in Delaware, Schoharie, Greene and Ulster Counties. The CAT System was constructed in the early part of the 20th century, and Ashokan Reservoir went into service in 1915. Water leaves Schoharie Reservoir via the 18-mile Shandaken Tunnel, which empties into the Esopus Creek just downstream of Allaben and then travels 22 miles to the Ashokan Reservoir. Water leaves Ashokan Reservoir via the 75-mile long CAT Aqueduct, which travels to the Kensico Reservoir.

The DEL System is comprised of 4 reservoirs: Cannonsville, Pepacton, and Neversink in the Delaware River basin, and Rondout in the Hudson River basin. The DEL System was constructed in the 1950s and 1960s. The 3 uppermost reservoirs supply Rondout Reservoir; water then leaves Rondout and travels toward the West Branch Reservoir in Putnam County via the 90-mile Rondout-West Branch Tunnel where it can enter, draw-off or bypass this reservoir. From there, water continues to travel to the Kensico Reservoir.

2.2 CATSKILL WATERSHED TRIBUTARIES

DEP representatives conducted a tour of the Catskill Watershed as part of the annual FAD Inspection for NYSDOH, NYCDOHMH and EPA representatives. The tour consisted of site visits throughout the watershed to show DEP's efforts to maintain source water quality. DEP also presented on flood-reduction efforts for towns in close proximity to the watershed. The Watershed Stream Management Tour displayed widespread attention to source water protection, particularly erosion control, and highlighted the improvements to significant conveyances previously damaged by tropical storm Irene. Although every project was different and site specific plans must be created for each site, it was clear that lessons learned from past projects were being incorporated into new projects. Moreover, every project showed the importance of collaboration between stakeholders to ensure that projects could be completed effectively. Overall, NYCDOHMH observed significant advances in stream bank stabilization illustrating successful approaches being implemented to reduce erosion within the watershed and turbidity events downstream.

2.3 ASHOKAN RESERVOIR

DEP representatives conducted a tour of the Ashokan Reservoir as part of the annual FAD Inspection for NYSDOH, NYCDOHMH and EPA representatives. Throughout reservoir facilities, maintenance of online water supply distribution and monitoring equipment were satisfactory. Sufficient lighting and security

measures were also observed at all locations. Significant progress had been made within the Ashokan Reservoir system to rehabilitate and improve operational capabilities on the reservoir dividing weir, aqueduct intake chambers and release channel. Among these improvements were the replacement of aged and/or inoperable flow control gates and screening devices, improvements in the water operator system, stabilization of the bridge, concrete repair work on the channel structure and overall lighting upgrades throughout the facility to improve energy efficiency. Dividing weir, aqueduct intake chamber and discharge channel work will continue into 2015.

2.4 CATSKILL AQUEDUCT

DEP representatives conducted a tour of the portion of the Catskill Aqueduct associated with the CAT/DEL UV Plant as part of the annual FAD Inspection for NYSDOH, NYCDOHMH and EPA representatives. DEP representatives also accompanied NYCDOHMH on a tour of additional requested Catskill Aqueduct facilities as part of the annual Sanitary Survey inspections. NYCDOHMH observed the ongoing construction work and improvements being made to the site and operations at the Catskill/UV Connection Chamber. The remaining aqueduct chambers inspected were either well maintained or under rehabilitation. Chambers close to chlorine disinfection exhibited larger degrees of corrosion on metal components of the chamber such as steel roof beams due to chlorine off-gassing. The corrosion of the building components did not interfere with overall operations of the water supply. DEP has taken steps to ensure that the water supply below the chamber is protected while they continue to plan and perform renovation work on these structures. NYCDOHMH recommended minor cleaning at two chambers.

2.5 RONDOUT RESERVOIR

DEP representatives conducted a tour of the Rondout Reservoir as part of the annual FAD Inspection for NYSDOH, NYCDOHMH and EPA representatives. Throughout reservoir facilities, maintenance of online water supply distribution and monitoring equipment were satisfactory. Online water supply distribution and monitoring equipment were in good working condition. Sufficient lighting and security measures were also observed at all locations. When touring the reservoir, the winterization of reservoir water quality monitoring equipment was reviewed. Recent improvements to this system included repairs on the general facility operations at the aqueduct intake chamber. The emergency water treatment capabilities in this facility have not been used since 2010, however equipment was ready to activate if necessary. Remediation efforts to remove lead paint continued and were under evaluation. The pilot study on the effectiveness of lime addition into the aqueduct to seal minor cracks was completed, in which DEP determined that it is not a stable long-term solution for filling-in the cracks.

2.6 DELAWARE AQUEDUCT

DEP representatives conducted a tour of the portion of the Delaware Aqueduct that interconnects the Catskill and Croton Water Supplies. The tours were conducted as part of the annual FAD Inspection for NYSDOH, NYCDOHMH and EPA representatives but were also associated with the Water for the Future Program which focuses on the Rondout-West Branch Bypass Tunnel construction and Delaware Aqueduct shutdown. Subsequently, NYCDOHMH independently inspected additional distribution equipment and associated water quality monitoring and operations instrumentation, and reviewed operations, maintenance, security and safety protocols with DEP representatives. NYCDOHMH observed continual improvements to the ongoing chamber maintenance program with considerable progress made in the development and implementation of Standard Operating Procedures (SOP) for care, maintenance and operations of older equipment. Substantial progress was made on the DEL Shaft 4/Interconnection project, which will link the Delaware and Catskill Aqueducts. In the Croton Watershed, the interconnection between the Delaware Aqueduct and the Cross River Reservoir was completed. The project included improvements to the water conveyance system, chemical delivery

system, and improvements to the building structure. The interconnection between the Delaware Aqueduct and the Croton Fall Reservoir was still underway.

2.7 KENSICO SYSTEM

For the Kensico system, NYCDOHMH accompanied EPA on quarterly watershed sampling events. NYCDOHMH also participated in the annual FAD inspection tours of the Kensico Reservoir and associated facilities which were conducted by DEP Representatives for NYSDOH, NYCDOHMH and EPA representatives. Additionally, NYCDOHMH inspected the water storage, watershed water quality management program, the distribution and water treatment equipment, and associated water quality monitoring and operations instrumentation; and reviewed operations, maintenance, security and safety protocols. Repairs and improvements were made to the fluoride addition and disinfection system. Grouting and roof work to mitigate water infiltration was completed. Planned upgrades include ventilation, chemical delivery, and gate motor system improvements. Current water quality management practices within the reservoir system were reviewed. DEP continued to monitor and manage the influent and effluent chambers for the reservoir as well as watershed tributaries. The structural integrity of the dam was continually monitored. Damaged fences and gates around the reservoir were repaired and rip rap was added in eroded areas. A planned shoreline stabilization project will break ground in 2015, and when completed, the existing wave breaker device will be removed.

2.8 HILLVIEW RESERVOIR

DEP representatives conducted a tour of the Hillview Reservoir and associated facilities as part of the annual FAD Inspection for NYSDOH, NYCDOHMH and EPA representatives. NYCDOHMH accompanied the EPA on their quarterly inspections of the Hillview monitoring equipment. DEP representatives also accompanied NYCDOHMH on a tour of additional requested facilities as part of the annual Sanitary Survey inspections. NYCDOHMH inspected the water storage, distribution and water treatment equipment and associated water quality monitoring and operations instrumentation; and reviewed operations, maintenance, security and safety protocols. Throughout reservoir facilities, maintenance of online water supply distribution and monitoring equipment were satisfactory. Sufficient lighting and security measures were also observed at all locations. Improvements were made to the supplemental automated chemical feed system, reservoir operation equipment and water quality data transmission to system operators. DEP further developed and refined the wildlife control program around the reservoir. New safety measures were implemented which included upgrading ventilation systems and installing safer stairs, handrails and hazmat cabinets. NYCDOHMH recommends that DEP consider an alternate storage location or implement secondary containment for equipment such as batteries that are stored close to the water supply.

Figure 2: NYC Aqueducts and Water Tunnels



Source: DEP/PA/AJ - 2006 Water Infrastructure

2.9 DISTRIBUTION TUNNELS CHAMBERS

NYCDOHMH was accompanied by DEP representatives on inspections of the Distribution Tunnel Chambers and associated facilities along City Tunnels 1, 2, 3 (phase 1), 3 (phase 2, Manhattan leg), Richmond Tunnel, the end of the New Croton Aqueduct and construction on the new Hudson Harbor Siphon Tunnel. NYCDOHMH inspected the distribution system equipment, water quality monitoring equipment and associated operating instrumentation; and reviewed the operations, maintenance, security and safety protocols. NYCDOHMH observed that DEP continued to maintain the chambers in an orderly manner. Aging equipment was carefully monitored, maintained and repaired, and maintenance contracts were also being carried out and monitored effectively. Data logging device upgrades continued throughout the system and all monitoring instrumentation were up to date on calibration. DEP continued to mitigate potentially damaging humidity year-round and salt water infiltration during the winter months. NYCDOHMH provided guidance to DEP for enhancing their in-house cross-connection control program regarding a uniform protocol throughout the water supply system for small diameter piping.

Boring on the new Staten Island Siphon Tunnel was near completion at the end of 2014. The purpose of this tunnel is to provide a redundant water line to Staten Island as well as to allow for dredging of the Hudson Harbor. NYCDOHMH toured the site and reviewed the progress of the project which will include a new chlorine booster station and upgrades to the existing drinking water and sewer mains in the area surrounding the siphon downtake and uptake.

2.10 SILVER LAKE TANKS

NYCDOHMH was accompanied by DEP representatives on inspections of the Silver Lake Water Storage Tanks and associated facilities. NYCDOHMH reviewed the work that was completed in 2014 within the Staten Island distribution system that improved pressure and water flow around the island. These improvements reduced dependency on the Silver Lake water storage tanks which then allowed for necessary repairs to begin in late 2014 on the North Tank distribution equipment. NYCDOHMH inspected the progress, observing DEP's competency in evaluating and safely performing the extensive repairs to the existing pipes and valves. After the repairs are completed, DEP plans to perform maintenance on the water storage compartments. Associated with the Silver Lake Tank operations is the Silver Lake Reservoir, which DEP continued to maintain the man-made reservoir structure and chambers as part of the Federal Dam Safety Regulation Act.

2.11 WATER TREATMENT BOOSTERS

NYCDOHMH was accompanied by DEP representatives on inspections of the water treatment booster stations within the distribution system. NYCDOHMH inspected the water treatment equipment, water quality monitoring equipment and associated operating instrumentation; and reviewed operations, maintenance, security and safety protocols. Observed water treatment operator data were compared to monthly reported data. NYCDOHMH observed that improvements to the chemical feed and delivery system at the Staten Island booster station continued to progress in 2014. Offline stations were properly disabled with chemicals removed, and some were capable of being rehabilitated if future chlorination needs arise.

2.12 PUMPING SYSTEMS

NYCDOHMH was accompanied by DEP representatives on inspections of the distribution pumping stations within the distribution system. NYCDOHMH inspected the pumping system equipment and associated instrumentation; and reviewed operations, maintenance, security and safety protocols for all

stations. Pumping operations & maintenance records, log books and worksheets associated with the online stations were reviewed on-site and found to be satisfactory. Ongoing preventative maintenance and improvement work were verified in the field. Ongoing work to implement a new maintenance management system continued. DEP staff members were observed performing routine and corrective maintenance on the equipment. The pumping stations were adequately equipped with safety resources such as PPE, MSD, and satisfactory and up to date safety and emergency plans. Environmental Health and Safety (EHS) and other SOP postings remained visible to staff at central locations. The facilities inspected were sufficiently secured. Noted improvements included repairs or planned repairs on valves, pipes, pumps and VFD motors in online chambers. Distribution system upgrades continued to improve the efficiency of the Douglaston Pumping Station. Each chamber, both online and offline, had new hose bibs on main taps or spigots to prevent backflow. NYCDOHMH recommended improving the documentation of the system conditions in the offline and dormant Queens satellite pumping stations.

2.13 OFFLINE CROTON WATER SYSTEM

The Croton System is the oldest of the 3 systems with parts having been in service for more than 150 years. Design, construction, and operations for this system began in 1842 and continued into the 1900's. The watershed, covering approximately 375 square miles, consists of 12 reservoirs and 3 controlled lakes which are connected primarily via open channel streams and rivers, and ultimately drain to the New Croton Reservoir in Westchester County. There are 14 dams within this system. Water leaves New Croton Reservoir and travels to NYC through the New Croton Aqueduct (NCA). The Dams within this reservoir have been undergoing rehabilitation while the system was offline to bring them up to current Federal dam standards.

In 1974, the Federal Government passed the National Dam Safety Act and in 1986, New York State developed dam-safety guidelines. Consequently, in 1988, rehabilitation studies began on the 14 Croton System dams. The studies identifying safety and engineering issues and to integrate the work into phases so each reservoir could be taken out of service without disrupting the water supply were completed. In 2002, construction work commenced to bring these critical components of the water supply infrastructure up to current safety standards. As of 2014, construction work on 13 out of the 14 dams within the Croton System has been completed, leaving the Croton Lake Dam as the final dam to be rehabilitated.

2.14 CROTON FALLS RESERVOIR

DEP representatives accompanied NYCDOHMH on a tour of the facilities, oriented the inspectors and produced documents for the inspections at the main office. In the chambers, various renovations and equipment additions had been completed. Opposite the dam, construction of a connection between Croton Falls Reservoir and a DEL Shaft will allow water to be pumped into the DEL to meet demand. Completion of the connection is expected in 2016. At the Croton Falls Dam, structural reinforcement and access improvement were completed, and dam façade repairs will be addressed under the 10 year plan. At the lower valve chamber, the Water Quality Monitoring Station (WQMS), water sampling tap, and various protocols were satisfactory. In the future, a project to convert a hydraulically-driven pumping station to an electrically-powered station with programmable logical control (PLC) architecture will occur.

2.15 CROTON LAKE RESERVOIR

Dam reconstruction work included upgrades to the upper and lower valve chambers at one of the gatehouses, zebra mussel infestation prevention, and structural reinforcement. Gatehouse structures affected by water infiltration and excessive humidity were repaired and monitored continuously. Gatehouse rehabilitation work was underway, including replacement and installation of various exterior

and interior equipment, with temporary fences and scaffolding present. At the New Croton Lake Gatehouse, replacement of the service water valves on the traveling screens was completed. At the Old Croton Lake Gatehouse, chemical treatment equipment was removed and the area was properly cleaned. The WQMS and sampling equipment was either offline until reactivation of the Croton system, or online but not scheduled for routine calibration. Biomonitoring equipment, other systems and overall upkeep were satisfactory. The Croton Lake Barn was demolished in 2014 and hereafter will not be present on the inspection list.

2.16 NEW CROTON AQUEDUCT

DEP representatives accompanied NYCDOHMH on a tour of the facilities, oriented the inspectors and produced documents for the inspections at the main office. At the time of inspection, most facilities were offline with ongoing construction underway. Progress made includes installation of new water quality monitoring stations, doors, locks, cranes, electrical, lighting, and roofs.

2.17 OFFLINE NYC GROUNDWATER WATER SYSTEM

DEP representatives accompanied NYCDOHMH on a tour of the facilities and produced documents for the inspections at the main office. DEP continued to pump wells to waste as part of the Wellhead Protection Program, whose sampling results, along with those from samples collected from wells within the Ground Water Rehabilitation Project, will be used to evaluate treatment needs for the Water for the Future program. All usable equipment was in good working condition, with submersible units effectively carrying out water quality testing where pumps were inoperable. Monitoring, reporting, and data verification were not performed given wells were inactive.

Security at all facilities inspected was adequate. DEP staff ensured that visitors had safety briefings and proper safety equipment while on the premises. Recommendations to address Graffiti on the backup generator at Station 13 and repairs to the VOC building door at Station 38 were addressed.

3 ONGOING MONITORING & SURVEILLANCE

The various drinking water monitoring and surveillance programs serve to evaluate water quality of the NYC drinking water system, to evaluate treatment effectiveness, to address immediate issues, to review water quality data and reports for compliance with the Federal, State and Local regulations, to work proactively with other agencies to prevent contamination, and ultimately to protect public health. NYCDOHMH is involved in several programs as described in the following sections.

3.1 DISTRIBUTION SAMPLING PROGRAM

This program provides oversight of NYC water supply water quality throughout the distribution system and analyzes the performance and effectiveness of DEP's water supply treatment system.

Sampling Sites

As part of this program, NYCDOHMH conducts routine drinking water sampling to provide a regulatory quality control check on the monthly compliance monitoring reports submitted by DEP. NYCDOHMH surveillance water samples are mainly collected from point-of-use sites inside public buildings such as fire stations, schools, and police stations, and inside commercial establishments such as laundromats, delicatessens, and restaurants. These sites are paired and analogous with a selection of DEP's distribution sampling stations. Among these sites are DEP's distribution compliance sites for entry point water quality and distribution system chlorine residual and disinfection by-product residual formation. A map with the approximate locations of the 2014 point-of-use sites is shown in Figure 3, with addresses listed in Figure 4 below. Compared to the 2013 survey, the number of locations remained the same, although some specific locations were changed.

Monitoring Parameters

In 2014, drinking water samples were collected once per month from the 73 routine surveillance sites for bacteria (total coliform) and water quality parameters (pH, temperature, turbidity, alkalinity, conductivity, total dissolved solids, phosphates, hardness, fluoride, chloride). At 8 of these sites, monthly samples were also collected for sulfates and nitrates. Monthly samples were collected for metals at 5 of the sites near the distribution tunnel entry points. Finally, at 5 of the sites in areas of Queens, Brooklyn, and Staten Island distribution system that have the longest water retention time, monthly samples were collected for volatile organic compounds. The number and frequency of samples remained unchanged from 2013.

Sample Results Review

Each month NYCDOHMH completes a regulatory review of its surveillance program monitoring results. The purpose of this review is to determine whether the water quality monitoring data for the NYC drinking water distribution system is in compliance with Federal, State, and Local regulations. NYCDOHMH also reviews, validates, and ensures that DEP meets all deliverables in the monthly operation reports on the distribution system, the Croton system, and the Filtration Avoidance Determination (FAD) for the CAT/DEL system in accordance with the Operation and Quality Control provisions of 10NYCRR Part 5, Subpart 5-1.72(c). DEP is required to notify NYCDOHMH when any operational water sample tests positive for E. coli and total coliforms.

Figure 3: Map of NYCDOHMH Sampling Sites

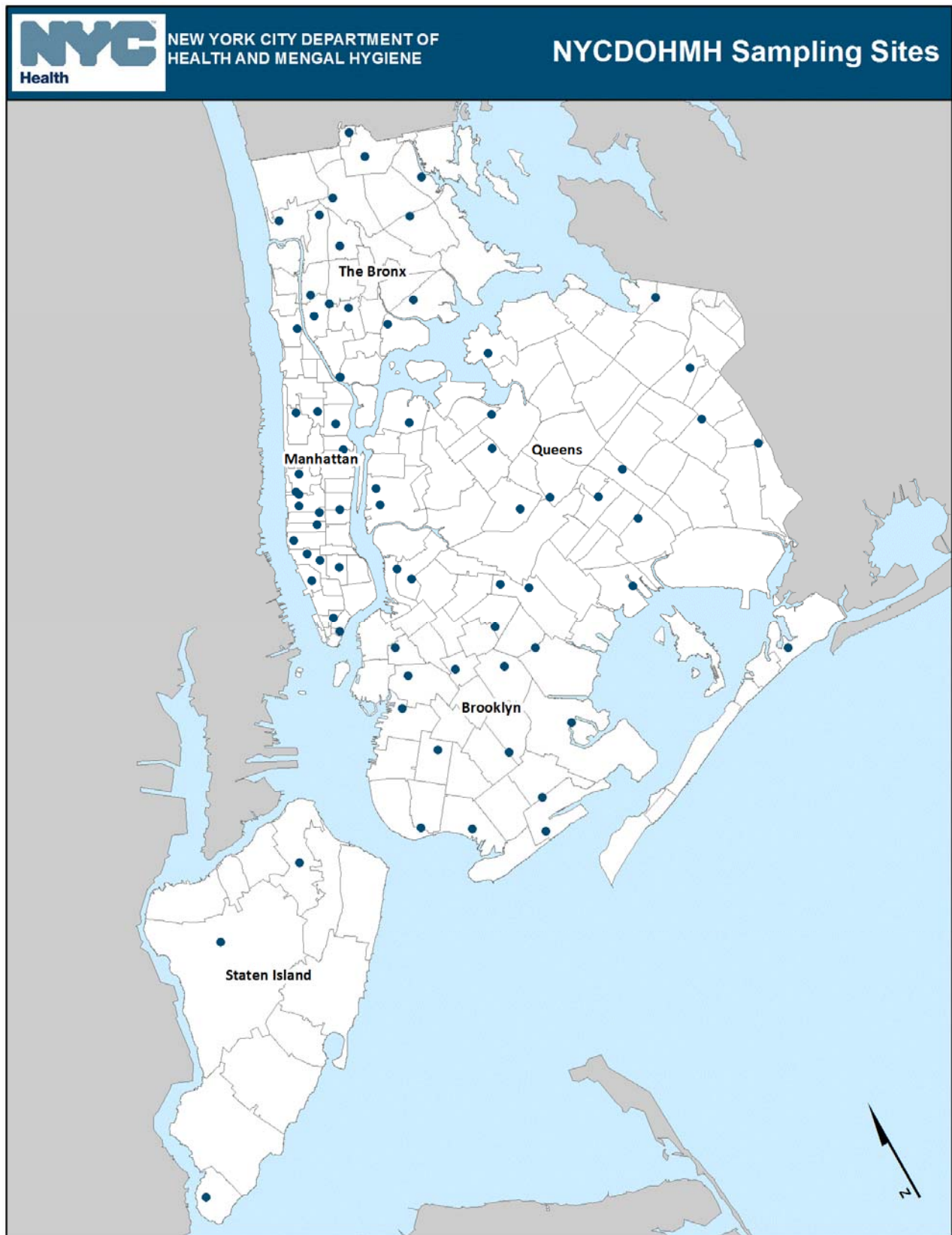


Figure 4: 2014 NYCDOHMH Sampling Sites

| NYCDOHMH Site ID | Site Location Name | Street Address | DEP Site ID |
|------------------|------------------------------------|----------------------------|-------------|
| BK03S | Laundromat | 352 South 1st Street | 27000 |
| BK07S | Anna Pizza | 179 Bedford Avenue | 21100 |
| BK08S | Atlantis Super Wash | 472 Atlantic Avenue | 22900 |
| BK11V | NYC Dept. of Health | 485 Throop Avenue | 23450 |
| BK16S | P.S. 45 Annex | 1160 Decatur Street | 21350 |
| BK17S | Family Health Center | 179 Jamaica Avenue | 26300 |
| BK23V | M.S. 51 William Alexander (K051) | 350 5th Avenue | 26500 |
| BK31S | Dunkin Donuts | 737 4th Avenue | 29350 |
| BK33S | P. S. 191 | 1600 Park Place | 24950 |
| BK38S | Firestone | 1750 Bedford Avenue | 25550 |
| BK40V | VA Hospital | 800 Poly Place | 22250 |
| BK42S | Kings Adult Care Center | 2255 Cropsy Avenue | 20650 |
| BK46S | Tandoory Bread | 4723 13th Avenue | 28950 |
| BK53V | Brighton Bazaar | 1007 Brighton Beach Avenue | 24350 |
| BK57S | Laundromat Lucky May | 1791 Ocean Avenue | 27450 |
| BK61S | Dental Office | 2818 Ocean Avenue | 24050 |
| BK62S | Brookdale Medical Center | 1380 Linden Boulevard | 24650 |
| BK66V | Deli & Grocery | 741 Linden Boulevard | 27350 |
| BK71V | P.S. 236 Mill Basin (K236) | 6302 Avenue U | 20050 |
| BX02V | Fire House Deli | 2690 3rd Avenue | 17550 |
| BX04S | Laundromat | 850 Hunts Point Avenue | 17750 |
| BX06S | 3rd Avenue Auto | 3495 3rd Avenue | 18800 |
| BX07S | I.S. 219 New Venture School (X219) | 3630 3rd Avenue | 10250 |
| BX10V | Superior Market Deli | 108 West 168th Street | IS07 |
| BX12V | Hato Viejo Deli | 1454 Grand Concourse | 15150 |
| BX14V | Golden Laundromat | 1615 Dr. MLK Boulevard | 11050 |
| BX17S | Subway Rest | 460 East Fordham Road | 13350 |
| BX21V | Eden Flower Shop | 147 East Gunhill Road | IS03B |
| BX23V | Bronx H.S. of Science | 75 Bronx Science Boulevard | 1SC21 |
| BX26S | Hudson Pointe Nursing Home | 3220 Henry Hudson Parkway | 17350 |
| BX29S | Gourmet Deli | 843 Sound View Avenue | 17650 |
| BX33V | Pathmark Pharmacy | 2116 Bartow Avenue | 10750 |
| BX36S | M & M Gourmet Deli | 2102 Eastchester Road | 18000 |
| BX37V | Laundromat | 980 East 233rd Street | IS03A |
| BX40S | 241 Street Café | 4703 White Plains Road | 17050 |
| MN01V | Café Water | 130 Water Street | 30550 |
| MN05V | P.S. 3 Charrette School | 490 Hudson Street | 31350 |

| NYCDOHMH Site ID | Site Location Name | Street Address | DEP Site ID |
|------------------|----------------------------------|----------------------------|-------------|
| MN08V | NYU Cafeteria | 202 East 12th Street | 37950 |
| MN11V | Hampton Market | 312 11th Avenue | 31750 |
| MN12V | P.S. 11 William T. Harris (M011) | 320 West 21st Street | 31550 |
| MN13V | Sacred Heart of Jesus (Pre-K-8) | 456 West 52nd Street | 31950 |
| MN14S | Foundling Hospital | 590 6th Avenue | 32650 |
| MN15S | M.D. | 1430 Broadway | 34300 |
| MN16S | Fresh & CO | 1211 6th Avenue | 36100 |
| MN18V | M.D. | 235 East 49th Street | 39650 |
| MN20S | John Jay C | 445 West 59th Street | 39200 |
| MN21S | P.S. 191 Amsterdam (M191) | 210 West 61st Street | 39400 |
| MN22S | Aroma Café | 161 West 72nd Street | 38150 |
| MN32V | Bareburger | 1681 1st Avenue | 38250 |
| MN35V | Hungarian Pastry Shop | 1030 Amsterdam Avenue | 37450 |
| MN38V | Laundromat | 25 Lenox Avenue | 33450 |
| MN42V | McDonalds | 1878 3rd Avenue | 33950 |
| MN45S | I.S. 164 Edward W. Stitt (M164) | 401 West 164th Street | 34650 |
| QN01S | Forever Young Deli | 21-03 45th Avenue | 40350 |
| QN02V | 41 Ave Candy Deli | 10-34 41st Avenue | 44350 |
| QN04S | Dunkin Donuts | 37-23 Ditmars Boulevard | 40250 |
| QN10S | La Costena Grocery | 101-06 Northern Boulevard | 40600 |
| QN13S | Delicious Food Market & Deli | 93-34 43rd Avenue | 40950 |
| QN15S | Miss Nails | 78-15 Metropolitan Avenue | 42100 |
| QN19S | Coffee Shop | 96-07 Metropolitan Avenue | 44950 |
| QN21S | Clear View Auto | 123-11 18th Avenue | 43550 |
| QN31V | Hillside Laundromat | 147-12 Hillside Avenue | 76150 |
| QN32V | Royal Class Deli | 120-03 Jamaica Avenue | 78150 |
| QN33V | Laundromat | 125-13 111th Avenue | 79550 |
| QN35V | Cross Bay Diner | 160-31 Cross Bay Boulevard | 45750 |
| QN41S | Dunkin Donuts | 248-09 Northern Boulevard | 47850 |
| QN42V | Pizzeria | 205-27 Hollis Avenue | 77650 |
| QN50V | P.S. 176 Cambria Heights (Q176) | 120-45 235th Street | 77750 |
| QN54V | Key Food Supermarket | 220-40 Hillside Avenue | 77550 |
| QN59V | Day Care Center | 44-02 Beach Channel Drive | 45250 |
| SI02V | Silver Lake Golf Course | 915 Victory Blvd | 50250 |
| SI12V | Tiffany Superette | 1650 Richmond Avenue | 50850 |
| SI19V | Kerrie's Laundry land | 211 Main Street | 58650 |

3.2 CONSUMER WATER QUALITY COMPLAINT INVESTIGATION

Investigation of water quality-related complaints from consumers is covered under the surveillance program. Consumers can submit drinking water complaints through New York City's free 311 call system or by directly contacting the NYCDOHMH office. The 311 operator refers complaints to either DEP or NYCDOHMH based on the consumer's description of the water quality problem.

When complaints are referred to the Office of Public Health Engineering (PHE) within NYCDOHMH, the office responds in a timely manner to provide technical assistance and professional oversight as needed to address any emergency or water supply related problem that might pose a risk for human health. The investigation may include, as applicable: reviewing all current water quality data; collecting water samples; analyzing the results to identify the existence of microbiological, physical and chemical contaminants in the water; determining the degree or extent of these contaminants within the area of investigation; comparing the results of the investigation to drinking water quality standards; and conducting follow-up when necessary. In addition, NYCDOHMH investigates the source for contamination including possible water main breaks and cross connections.

In 2014, NYCDOHMH received and investigated approximately 162 water related complaints of which one was referred to bottled water and 161 concerned city drinking water. There were no public health hazards or any findings of concern related to city drinking water identified during these investigations. The majority of complaint calls were from the borough of Manhattan, with the greatest density of calls within neighborhoods in the upper west side of Manhattan and during the month of April.

3.3 CROSS CONNECTION CONTROL PROGRAM

Under 10NYCRR Part 5, DEP has the responsibility to prevent water from unapproved sources, or any other substance, from entering the public water system by containment of potential contamination sources within the premises of the customer. In order to enforce 10NYCRR Part 5, Subpart 5-1.31, and Title 15, Chapter 20 of the Rules of the City of New York and also to meet the requirements of Section 8.2 of the July 2007 EPA FAD, DEP has implemented the Cross Connection Control Program (CCCP). DEP's CCCP uses the State Health Department's guidelines to categorize certain businesses as being potentially hazardous. As such, DEP has identified the following facilities where hazards or potential hazards are known or expected to exist, and requires the installation of an approved backflow prevention device on the water service connection to the property:

- Auto Repair shops
- Barber Shops and Beauty Salons
- Breweries
- Canneries
- Commercial Car Washes
- Commercial Greenhouses
- Dye Plants
- Exterminators
- Food Processing Facilities, and Meat or Fish Packers
- Funeral Homes and Mortuaries
- Hospitals, Clinics and Laboratories
- Laundries and Dry Cleaners
- Medical and Dental Offices
- Metal Plating operations
- Nursing Homes
- Paper Processing facilities
- Photo-Processing Facilities
- Premises with Roof Tanks and Elevated Storage Lines
- Properties with In Ground Irrigation Sprinklers
- Residential Dwellings with Treated Water Boilers
- Schools and Colleges (with Laboratories)
- Sewage Treatment Plants or Handling Facilities
- Shipyards and Marinas
- Tanneries

In 2014, NYCDOHMH conducted an onsite program review of DEP's CCCP operation files and computer database records at the DEP office. The review included: backflow prevention device application review and approval (including engineering plan), installation and initial testing, annual tests and maintenance history, and all Orders and Notice of Violation (NOV) correspondences. NYCDOHMH also conducted onsite inspections of 8 hazard facilities, including some/all of those previously classified as aesthetically objectionable facilities. These sites were randomly selected from DEP's CCCP database with an engineering plan approved as initial or annual device test reports and verified by CCCP staff.

NYCDOHMH also reviewed the annual CCCP reports to ensure that regulatory compliance requirements were being achieved. NYCDOHMH concluded that the DEP's CCCP exceeded the anticipated milestones established in the Section 8.2 of the July 2007 EPA FAD. During 2014, DEP continued to improve the program in the following areas:

- Implemented a digital NOV process to replace the hand written notices that have been used previously for many years, which expedites the violation notification process. As a result, the number of NOVs issued for property owners who have not submitted the required backflow prevention device annual test reports increased dramatically between 2013 and 2014 (1382 vs. 3365).
- Allocated more staff to this NOV process change in tasks such as report filing and representing DEP at hearings at the Environmental Control Board (ECB) involving these issues.
- Implemented an on-line application processing program for cross-connection devices, water service and meter permits. The program allows users to file plans online and once the application is reviewed and approved, an electronic approval stamp will be used to identify plans that have been accepted.

3.4 LEAD AND COPPER RULE REVIEW

In 1991, EPA published a regulation in the Federal Register to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (LCR). Under this law, DEP is mandated to conduct at-the-tap lead monitoring in selected households throughout New York City. In conjunction with NYSDOH, NYCDOHMH reviews, comments, and provides regulatory oversight on DEP's Lead and Copper related submittals by evaluating compliance with the LCR. NYCDOHMH and NYSDOH also ensure that protocols for LCR, 10NYCRR and Environmental Laboratory Approval Programs (ELAP) are followed, and that all statutory requirements of 10NYCRR are fulfilled. Specifically, NYCDOHMH provides regulatory oversight of the following programs within the LCR: (1) Compliance sampling pool review for at-the-tap sampling during the monitoring period, (2) water quality monitoring for optimum corrosion control treatment, and (3) DEP additional (non-compliance) at-the-tap monitoring and free residential testing program.

- (1) The compliance sampling pool consists of 254 sites, where 145 sites (57%) have lead service lines and 109 sites (43%) have copper pipes joined by lead solder. A total of 191 samples, 105 from the sites with lead service lines (55%) and 86 from the sites with copper pipes joined by lead solder (45%), were collected during the June-September 2014 monitoring period. These samples were analyzed and used to calculate the 90th percentile concentration. The 90th percentile lead result was 11 micrograms per liter ($\mu\text{g/L}$) and the 90th percentile copper concentration was 0.0194 milligrams per liter (mg/L). Both lead and copper concentrations did not exceed the 90th percentile Action Level, lead (15 $\mu\text{g/L}$) and copper (1.3 mg/L), as outlined under 40 CFR §141.80(c) (1) and Subpart 5-1.41(a).
- (2) The water quality reports received a satisfactory compliance review, which included:
 - A. *Source Water (Entry Point) Review*

Since source water lead concentrations did not exceed 5 $\mu\text{g/L}$, nor did source water copper concentrations exceed 0.8 mg/L , no source water treatment modification is required, as prescribed by SSC Subpart §5-1.47(a)(1)(i). The reports showed that the pH range and the orthophosphate range were in compliance with the State specified levels.
 - B. *Distribution Water Quality Monitoring*

During this monitoring period, there were no lead results exceeding 15 $\mu\text{g/L}$, nor did copper concentrations exceed 1.3 mg/L . The reports showed that both the pH range and the orthophosphate range were in compliance with the State specified levels.
- (3) During 2014, a total of 944 at-the-tap samples, collected by residents themselves, were analyzed for lead and copper. None of these data were used to calculate 90th percentile concentration. DEP shared the data with DOHMH for all sample results exceeding the lead and copper action levels.

In 2014, in addition to reviewing DEP's compliance sampling site selection and sampling pool size determination, NYCDOHMH reviewed data from residential sites with identified high lead levels in drinking water. For these residences, a review of records was conducted in cooperation with NYCDOHMH's Lead Poisoning and Prevention Program (LPPP) to verify the presence of children with elevated blood lead levels.

3.5 WATERBORNE DISEASE SURVEILLANCE

Giardiasis and Cryptosporidiosis Cases

Public Health surveillance for cryptosporidiosis and giardiasis began in 1993 with the establishment of NYC's Waterborne Disease Risk Assessment Program (WDRAP) jointly administered by NYCDOHMH, Bureau of Communicable Disease (BCD) and the DEP, Bureau of Water Supply. In 1994, Article 11 of the NYC Health Code was amended to include cryptosporidiosis as a mandatory reportable disease of public health interest. NYCDOHMH maintains a proactive approach with preventative measures such as active disease surveillance of reported cases, information sharing and public education. Active disease surveillance includes monitoring clinical facilities and emergency room department reports, conducting patient interviews that verify the data collected, collecting additional demographic and clinical information, and attempting to identify the possible sources of exposure. In January 2011, active laboratory surveillance for possible giardiasis, cryptosporidiosis and other gastrointestinal disease outbreaks was discontinued and replaced by an electronic reporting system.

In accordance with the FAD, WDRAP publishes an annual report to track program progress, and data compiled to report cases and case rates of cryptosporidiosis and giardiasis in New York City. In addition, the report provides a detailed analysis of risk factors, demographic information, and socioeconomics of case-patients and an overview of the syndromic surveillance system used to track diarrheal and gastrointestinal illness for rapid detection of potential waterborne disease outbreaks. The reports show that rates of both giardiasis and cryptosporidiosis have been decreasing since 1994 over the years of the surveillance program.

In 2012, the outbreak detection systems that monitor daily sales of over the counter (OTC) and non-prescription antidiarrheal medications (ADM) at major store chains were merged. The ADM was managed by DEP and the OTC by NYCDOHMH. To insure a smooth transition, DEP continued to run the ADM system into 2014. An evaluation conducted by NYC concluded that the combined system is equally or more effective than the two systems previously in place.

From 2013 to 2014 the cryptosporidiosis case rate increased from 1.0 per 100,000 to 1.2 per 100,000 (102 cases). Per the 2011 change in case definition by the CDC, and noted in the 2012 WDRAP Annual report, the case rate now includes both confirmed and probable cryptosporidiosis cases. Annual case numbers increased 27.5% from 2013 to 2014.

From 2013 to 2014, the giardiasis case rate increased from 9.2 per 100,000 population in 2013 to 10.4 per 100,000 (864 cases). Annual case numbers increased 12.6 % from 2013 to 2014.

On a routine basis, DEP conducts monitoring for Giardia, Cryptosporidium and human enteric virus at five key points of the City source water supply system, the two influents and effluents of Kensico Reservoir and the one effluent of New Croton Reservoir. In 2014, NYCDOHMH reviewed the concentration and detection frequency of these parameters and provided technical input for the Cryptosporidium Action Plan and New York City Drinking Water E. coli Violation and Boil Water Action Plan.

Legionnaires Disease Cases

Legionnaires' disease is also a reportable disease in NYC. NYCDOHMH has an active surveillance program for all reported cases from physicians. These physicians are interviewed by the NYCDOHMH Bureau of Communicable Diseases to confirm diagnosis and collect information on potential exposures. If an outbreak occurs, NYCDOHMH, and in some cases NYSDOH, in association with the NYCDOHMH Bureau of Communicable Disease undertakes investigations and development of response plans to findings of Legionella in drinking water supply. Working jointly with facility maintenance personnel, NYCDOHMH reviews a building water system, conducts a walkthrough inspection, designs a sampling protocol, collects and reviews water samples, provides engineering input on disinfection system design and implementation, recommends water treatment and system operation and maintenance, and plans corrective and control actions. In 2014, NYCDOHMH responded to and investigated 14 cases of Legionella found in building drinking water supplies.

3.6 DEP WATER QUALITY REPORT REVIEWS

Through its role as an oversight agency, NYCDOHMH reviews and approves water quality reports that DEP must submit to the public or State and Federal agencies. In addition to the monthly operation reports in Section 3.1, NYCDOHMH completes a review of the Annual Drinking Water Supply and Quality Report that is disseminated to the public every year as required by 10NYCRR Part 5, Subpart 5-1.72, and 40CFR Part 141 Subpart 131. These regulations require all drinking water suppliers to provide the public with an annual statement describing the water supply and the quality of its water.

NYCDOHMH continued monitoring DEP's expended "good faith" efforts in accordance to January 2013 EPA memorandum Safe Drinking Water Act – Consumer Confidence Report Rule Delivery Options, which entailed the following (1) inserting a notice in several languages in all water bills, (2) sending electronic notification to e-bill users, and (3) mailing postcards to customers who are billed annually. NYCDOHMH also reviewed and verified the methods and effectiveness of the public dissemination of the 2014 Annual Report. A detailed review of the annual data revealed that all the information presented to the public was accurate and comparable to NYCDOHMH findings.

3.7 WATER TREATMENT OPERATOR CERTIFICATION REVIEW

Pursuant to 10 NYCRR Part 5, Subpart 5-4, personnel who operate community and non-transient non-community public water systems and make process controls/system decisions impacting water quality and quantity must obtain and maintain appropriate level of certifications as issued by NYSDOH. There are six grades of certification based on the size and complexity of the different water systems; each certification ensures that the operators meet the minimum level of competence. As defined in Subpart 5-4 and associated guidelines, NYCDOHMH follows the qualification and certification criteria to conduct reviews and on-site assessment of applicant for operator certification. All certification recommendations are forwarded to NYSDOH for review.

Since 2013, NYCDOHMH is actively working with DEP in the design and development of a proposed evaluation program for the staff in Croton Filtration Plant. As part of this cooperative effort, NYCDOHMH is providing oversight of DEP's progress to ensure that an appropriate number of staff with the required water treatment plant operator certifications is available to operate this new filtration plant. In 2014, the program completed application reviews, conducted onsite assessments and submitted 19 operator certification applications to NYSDOH for approval. Among these 19 applications, 18 individuals applied to become grade IIB operators, and 1 applicant applied to become a grade D operator. All 19 applications were approved.

3.8 CAPITAL PROJECT REVIEW

CAT/DEL UV Plant

The surface water supply system that involves the Catskill and Delaware basin sources (CAT/DEL) has been exempted from the filtration requirement of the SWTR by EPA and NYSDOH, as documented in the Filtration Avoidance Determination (FAD). UV disinfection for this system, as mandated by the Long Term 2 Enhanced Surface Water Treatment Rule (LT2), began at the Eastview site in Mount Pleasant, Westchester County. The facility was designed to disinfect over 2 billion gallons of water per day. NYCDOHMH has been involved in conducting ongoing reviews of the progress of the CAT/DEL UV treatment facility startup throughout the year.

In October 2014, DEP representatives conducted a tour of the CAT/DEL UV Plant and associated facilities as part of the annual FAD Inspection for NYSDOH, NYCDOHMH and EPA representatives. The water quality lab, monitoring stations, sampling locations, UV equipment, distribution equipment, alarms, backup power supply system, security measures were reviewed and deemed satisfactory. DEP competently provided an overview of the system, operations and planned improvements, and further demonstrated how they are continuing evaluate and refine the efficiency of operations. Substantial progress has been made to improve general maintenance on the UV units and to improve conditions at the Catskill Aqueduct connection site. DEP was in the process of re-evaluating the dosing protocol, system programming and reporting functions and standby lamp usage.

By the end of 2014, the CAT/DEL UV Plant was commissioned as substantial progress had been made on most construction contracts. Remaining work included: facility optimization, computer system updates, communication upgrades, warranty repairs, punch-list completion and change order work.

Croton Water Filtration Plant

In April and November of 2014, NYCDOHMH toured the treatment plant with DEP to review the plant's disinfection and start-up processes. The planned start-up date for the Croton Water Treatment Plant is May 2015. In November 2014, NYCDOHMH began working with DEP to finalize the New Croton Aqueduct Disinfection and Start-up Plan which is the critical water conveyance system for the CWTP to the distribution system.

Delaware Rondout-West Branch Tunnel Bypass

The Delaware Rondout-West Branch Tunnel (RWBT) conveys Delaware system water under the Hudson River from Rondout Reservoir to West Branch Reservoir. It is a critical system component that typically conveys more than half of the total NYC daily supply. The tunnel has significant leaks in two locations on the east side of the Hudson River, estimated to be between 15 and 35 MGD. Repairing the Tunnel is critical and will include constructing a secondary (bypass) tunnel under the Hudson River. The bypass construction timeline consists of: Phase One (shaft construction) from 2013 to 2015; Phase 2 (bypass tunnel construction) from 2015 to 2021; and Phase 3 (bypass connection and tunnel repairs) from 2021 to 2022. During Phase 3, the RWBT will have to be taken offline, and the Delaware Water System will not be available to supply the system for 6 to 15 months.

Throughout 2014, NYCDOHMH continued to assist in the design review process for Phase 1 & 2 of the RWBT. In November 2014, DEP accompanied NYCDOHMH and NYSDOH on a tour of the Delaware Bypass Tunnel Construction. The tour consisted of site visits to the existing DEL Shaft 6 Chamber, the Hudson River Pumping Station, the Roasting leak expression site on the east side of the Hudson River, and the construction sites of the new bypass shaft chambers of DEL Shaft 5B and 6B.

Water for the Future Program

In conjunction with and in response to RWBT shutdown, DEP has launched the *Water for the Future* campaign which includes plans to provide augmentation to the current water supply. At the time of the RWBT shutdown, the NYC Water system will have additional water sources that are not currently available, such as the Croton Water Filtration Plant and inter-system pumping stations for up to a maximum of 530 MGD. However, even with the additional future supplies, the city will still have a need of up to 240 MGD that it does not currently have (for the 6 to 16 month duration of the RWBT shutdown).

DEP continues to conduct augmentation activities, including examining the feasibility and regulatory requirements of various water supply augmentations, including repair and rehabilitation of the Catskill Aqueduct due to begin in 2016. This project will include replacing more than 30 decades old valves and scrubbing the interior linings to reduce friction which will increase the tunnel's capacity by approximately 30 to 40 MGD. In 2014 planning continued for the rehabilitation of the Queens Groundwater System, formerly the Jamaica Water Supply, which will sustainably provide more than 33 MGD in southeast Queens. A study conducted in 2010 to assess the potential of the groundwater system to augmentation identified a total of 52 wells at 34 well stations that would be suitable for reactivation. In most circumstances, wells would need to be repaired and equipment upgraded to restore the well stations to a reliable operation.

DEP will also implement a number of initiatives to reduce water consumption in the city by as much as 50 MGD between now and 2021, when the Delaware Aqueduct shuts down. As part of the Municipal Water Efficiency Program, DEP is identifying opportunities to conserve water at city-owned properties and facilities. To help encourage water conservation in private residences, DEP will sponsor "The Toilet Replacement Program" to replace 800,000 toilets. These replacements are expected to reduce current demand by 30 MGD.

4 CONCLUSION

For the 2014 Sanitary Survey Field Inspection, in accordance with the sanitary survey guidelines, NYCDOHMH has determined that DEP was effective in its operations downstream of the Kensico Reservoir in producing and distributing safe drinking water to the City of New York. No public health hazard violations or significant deficiencies were observed during the inspection of the NYC Water Supply in 2014. All of the major system components and facilities were in compliance with the requirements of 40CFR, Part 141 and 10NYCRR, Part 5. However, during inspections minor recommendations were made by NYCDOHMH to improve operating conditions.

For the ongoing monitoring and surveillance program, no public health hazards or any findings of concern related to city drinking water supply were found during the NYCDOHMH drinking water sampling review and consumer complaints investigations. NYCDOHMH has concluded that DEP's CCCP greatly exceeded the milestones established in the Section 8.2 of the July 2007 EPA FAD. A detailed review of the DEP Annual Water Quality Report data revealed that all the information presented to the public was accurate and comparable to NYCDOHMH findings.

Finally, NYCDOHMH acknowledges the general effort of DEP and all of the individuals involved in operating and maintaining the New York City Drinking Water Supply System to safely and without interruption deliver drinking water to over 9 million people a day from a source as far as 125 miles away. NYCDOHMH observed that DEP continued to adequately maintain and improve the NYC water supply system to the best of their ability. The office thanks DEP for its cooperation and assistance while conducting the 2014 Sanitary Survey.

5 REFERENCES

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