

BEFORE THE
PHILADELPHIA WATER, SEWER AND STORM WATER RATE BOARD

In the Matter of the Philadelphia Water Department's Proposed Change in Water, Wastewater and Stormwater Rates and Related Charges	Fiscal Years 2019-2021
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Direct Testimony

of

Debra A. McCarty

on behalf of

The Philadelphia Water Department

Dated: February 12, 2018

1 **DIRECT TESTIMONY OF DEBRA MCCARTY**

2

3 **I. Introduction and Purpose of Testimony**

4

5 **Q1. PLEASE STATE YOUR NAME AND WORK ADDRESS FOR THE**

6 **RECORD.**

7 A1. My name is Debra McCarty. My business address is 1101 Market Street, Fifth

8 Floor, Philadelphia, Pennsylvania.

9

10 **Q2. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

11 A2. I am employed by the City of Philadelphia and serve as the Commissioner of the

12 Philadelphia Water Department (“Department” or “PWD”).

13

14 **Q3. WHAT ARE YOUR JOB RESPONSIBILITIES?**

15 A3. I am responsible for oversight of all operations of the Department.

16

17 **Q4. WHAT IS YOUR EDUCATIONAL BACKGROUND?**

18 A4. I have a Bachelor of Engineering Sciences Degree with a major in Environmental

19 Engineering from Johns Hopkins University. My resume provides a more detailed

20 description of my educational background and work experience and is attached as

21 Schedule DM-1.

22

23 **Q5. PLEASE DESCRIBE YOUR RELEVANT WORK EXPERIENCE.**

24 A5. After serving in a private engineering firm for a few years, I joined the Department

25 in August 1982 as a Sanitary Engineer (Treatment Headquarters Group) at the

1 Northeast Water Pollution Control Plant. In that position, I was responsible for
2 various plant related projects and outside pumping stations. In May 1984, I
3 transferred to the Plant Operations Group at the Northeast Water Pollution Control
4 Plant where I continued and expanded my responsibilities for the coordination of
5 eight construction projects and related activities.

6
7 In July 1989, I was promoted to Process Manager at the Northeast Water Pollution
8 Control Plant where I had direct control of plant processes at that 210 million
9 gallons per facility. My responsibilities included assuring compliance with
10 NPDES permit requirements, minimizing malodor emissions, implementing
11 operational changes and leading special projects.

12
13 In July 1993, I assumed the post of Plant Manager at the Southwest Water
14 Pollution Control Plant. In this position, I had overall responsibility for the
15 operation of a 200 million gallons per day plant, managed a staff of 135
16 employees, and directed and provided technical assistance to process engineers
17 and operations staff to assure compliance with NPDES permit and Clean Water
18 Act requirements, among other responsibilities. During my tenure, I successfully
19 lead the team which brought the facility into compliance with a Federal Consent
20 Decree.

21
22 In October 1999, I was promoted to the position of Chief of Wastewater
23 Treatment. In that capacity I was responsible for the operation of three water
24 pollution control plants (also referred to as wastewater treatment plants) which, at
25 that time, had a combined average treatment capacity of 522 million gallons per

1 day, a combined annual operating budget of \$34.7 million and approximately 330
2 employees. This job represented an expansion of duties covering the overall
3 wastewater treatment system including, environmental compliance, capital
4 budgeting and a roster of other duties in operations.

5
6 In April 2004, I was appointed as Deputy Water Commissioner in charge of
7 managing the Department's Operations Division. In that capacity, I was
8 responsible for oversight of operation and maintenance of the City's water and
9 wastewater facilities, including three water treatment plants, three wastewater
10 treatment plants and oversight of the contract operation of the biosolids recycling
11 facility. My responsibilities also included managing the operation and
12 maintenance of water mains, sewers, stormwater inlets, water and wastewater
13 pumping stations and fire hydrants throughout the City. In this capacity, I also
14 oversaw water and wastewater services to suburban contract customers.

15
16 I was appointed as Commissioner in January 2016.
17

18 **Q6. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

19 A6. The purpose of my testimony is to describe: (i) the Department and its mission,
20 (ii) the actions we take to ensure the delivery of safe drinking water to our
21 customers and the provision of high quality wastewater treatment and water
22 pollution control services for wastewater that is discharged to the City's rivers and
23 creeks; (iii) current customer assistance programs and customer service programs
24 administered by the Department and the recent steps taken to improve these
25 programs and enhance the quality of customer service; and (iv) recent initiatives

1 to ensure that our customers benefit from efficient operations, future strategic
2 planning and innovative technologies.

3
4 **II. The Department and Its Mission**

5
6 **Q7. PLEASE PROVIDE AN OVERVIEW OF THE PHILADELPHIA WATER**
7 **DEPARTMENT AND ITS SERVICES AND OPERATIONS.**

8 A7. The Water Department is one of the City's ten operating departments. We serve
9 the City of Philadelphia by providing an integrated water and wastewater system,
10 including conveyance and treatment facilities for stormwater and sanitary
11 wastewater. The Department operates under a dedicated Water Fund established
12 to ensure that the revenues received from our customers are used for Water
13 Department purposes. We operate, maintain, repair and improve the water and
14 wastewater systems.

15
16 The water system provides water service to approximately 480,000 active retail
17 accounts. In addition, the system provides water service to Aqua Pennsylvania
18 pursuant to an agreement for wholesale water service. The water system obtains
19 approximately 59% of its water from the Delaware River and the balance from
20 the Schuylkill River. The City currently is authorized by the Pennsylvania
21 Department of Environmental Protection (PaDEP) to withdraw up to 423 million
22 gallons per day (MGD) from the Delaware River and up to 258 MGD from the
23 Schuylkill River.

1 The wastewater system serves approximately 545,000 retail accounts, including
2 approximately 50,000 stormwater-only accounts. In addition, wastewater service
3 is provided to ten municipalities or municipal authorities pursuant to wholesale
4 service contracts for wastewater.

5
6 **Q8. WHAT ARE THE MAJOR ASSETS AND FACILITIES THAT THE**
7 **DEPARTMENT UTILIZES TO PROVIDE WATER AND WASTEWATER**
8 **SERVICES TO ITS CUSTOMERS?**

9 A8. Water treatment is provided by three water treatment plants. The combined rated
10 capacity of these plants is 546 MGD; and their combined maximum capacity from
11 the two rivers that supply these plants is 680 MGD. The water system's
12 infrastructure, in addition to the treatment plants, includes approximately 3,200
13 miles of water mains, approximately 25,000 fire hydrants, and multiple finished
14 water storage facilities and water pumping stations.

15
16 The Department's wastewater system includes: three wastewater treatment plants,
17 approximately 3,700 miles of sewers, 19 pumping stations, over 94,000 manholes,
18 26 storm relief structures, 72,000 stormwater inlets, 175 combined sewer overflow
19 structures, 56 flow-monitoring stations, and a privately managed centralized
20 biosolids recycling center. The three wastewater treatment plants have a 522 MGD
21 combined average daily design capacity and a peak capacity of 1,059 MGD. The
22 sewer system includes approximately 1,850 miles of combined sewers, 760 miles
23 of sanitary sewers, and 740 miles of stormwater sewers, 13 miles of force mains
24 (sanitary and storm) and 350 miles of appurtenant piping.

1 In support of these operations, the Department also operates a sophisticated testing
2 laboratory and a range of technical and administrative support services. The
3 Department's assets also include some green stormwater infrastructure. I will
4 discuss green stormwater infrastructure in greater detail in the *Green City, Clean*
5 *Waters* portion of my testimony. Examples of the various types of green
6 stormwater infrastructure are provided in Schedule DM-2.

7
8 The biosolids recycling center, which is adjacent to the Southwest Water Pollution
9 Control Plant, treats and distributes up to 6,570 dry tons of biosolids captured
10 during the wastewater treatment process. Wastewater sludge is delivered from the
11 water pollution control plants to the biosolids recycling facility by pipelines or by
12 two City-owned tank barges, "The Recycler" and "The Resource." Additional
13 information on the biosolids recycling center is provided in Schedule DM-3.

14
15 **Q9. HOW DOES THE DEPARTMENT STAFF ITS OPERATIONS?**

16 A9. The Department employs approximately 2,125 people to operate and support its
17 extensive facilities and infrastructure.

18
19 **Q10. PLEASE IDENTIFY ANY CHANGE IN THE CENSUS OF LARGE**
20 **INSTITUTIONAL OR WHOLESALE CUSTOMERS SINCE THE LAST**
21 **RATE PROCEEDING CONCLUDED IN JUNE OF 2016.**

22 A10. There is only one change noted below. The City of Philadelphia is still the largest
23 customer of the Water Department. The ten largest customers in Fiscal Year 2016
24 included: the Philadelphia Housing Authority, the School District of
25 Philadelphia, Veolia Energy Philadelphia, University of Pennsylvania, Honeywell

1 Resin & Chemicals, LLC, SEPTA, the Federal Government, Temple University
2 and Paperworks Industries. It should be noted that Paperworks Industries, which
3 was the Department's tenth largest customer, closed its plant in April 2017 and
4 has ceased its manufacturing operations in the City. No wholesale customers have
5 left or come into the system since the last rate proceeding.
6

7 **Q11. WHAT IS THE PRIMARY MISSION OF THE WATER DEPARTMENT?**

8 A11. The Department's primary mission is to plan for, operate and maintain both the
9 infrastructure and organization necessary to purvey high quality drinking water,
10 to provide an adequate and reliable water supply to meet all household,
11 commercial and community needs, and to sustain and enhance the region's
12 watersheds and quality of life by managing wastewater and stormwater
13 effectively.
14

15 **III. Delivery of Safe Drinking Water**
16

17 **Q12. PLEASE DESCRIBE THE ACTIONS THE DEPARTMENT TAKES TO**
18 **ENSURE THE DELIVERY OF SAFE DRINKING WATER TO ITS**
19 **CUSTOMERS.**

20 A12. The Department is committed to producing and delivering safe and high-quality
21 drinking water to its customers. To ensure that tap water is safe to drink, the U.S.
22 Environmental Protection Agency (EPA) and PaDEP have promulgated
23 regulations which limit the amounts of certain contaminants in water provided by
24 public water systems. PWD has, in many instances, adopted internal water quality
25 goals that are more stringent than the applicable state and federal regulations. The

1 Department is equally committed to delivering its treated water and maintaining
2 its distribution system with adequate pressure and supply to reliably meet all
3 system needs, including fire protection.

4
5 The key objectives and strategies for accomplishing the PWD's water quality and
6 supply goals include: (a) complying with all federal and state drinking water
7 standards and achieving the Department's more rigorous performance standards
8 as defined by the Partnership for Safe Water, (b) strengthening the Department's
9 role in protecting the region's source water, (c) optimizing quality and reliability
10 of treatment procedures, (d) implementing best management practices in the
11 distribution system to assure water quality and reliability of supply, and (e)
12 employing advanced monitoring and analysis capabilities to support the
13 Department's water quality objectives.

14
15 **Q13. IS THE DEPARTMENT IN COMPLIANCE WITH THE FEDERAL AND**
16 **PENNSYLVANIA SAFE DRINKING WATER ACTS AND THE RULES**
17 **AND REGULATIONS ISSUED UNDER THESE ACTS?**

18 A13. Yes. The Department is in full compliance with the Federal and Pennsylvania Safe
19 Drinking Water Act and the rules and regulations issued under these acts,
20 including the Federal and State Lead and Copper Rules and the rules requiring
21 public water suppliers to prepare and provide their customers with annual
22 consumer confidence reports on the quality of water delivered by their systems.

1 **Q14. WHAT STEPS HAS THE DEPARTMENT TAKEN SINCE THE LAST**
2 **RATE PROCEEDING TO COMPLY WITH THE LEAD AND COPPER**
3 **RULES?**

4 A14. As a public water system subject to the Federal and Pennsylvania Lead and
5 Copper Rules, the Department must conduct monitoring ever three years to make
6 sure that the Department's corrosion control treatment is working. The
7 Department's corrosion control program is mandated by these rules and has been
8 optimized by the Department over the past two decades. This program minimizes
9 the release of lead from service lines, pipes, fixtures and solder by created a
10 coating designed to keep lead form leaching into water.

11
12 EPA has set the action level for lead in drinking water at 15 parts per billion (ppb)
13 and requires public utilities to provide treatment so that water from the customer's
14 tap does not exceed this level in at last 90 percent of the homes sampled, which
15 represents the 90th percentile value. The most recent regulatory sampling was
16 completed in calendar year 2017 and shows that that the Department's corrosion
17 control program is effective in controlling corrosion in our customer's piping. The
18 90th percentile level was 2 ppb, which is well within EPA's Action Level of 15
19 ppb.

20
21 In addition to the required testing, the Water Department continuously monitors
22 drinking water and conducted additional testing in 2016 of homes with lead
23 service lines. Of the 263 customers the Water Department contacted, 68 had lead
24 service lines that were verified and completed the required sampling. Only one
25

1 home had lead that exceeded the EPA's Action Level of 15 ppb, recording 25 ppb.
2 During extensive follow-up sampling at this home, lead was detected below 5 ppb.
3

4 **Q15. WHAT HAS THE DEPARTMENT DONE SINCE THE LAST RATE**
5 **PROCEEDING TO COMPLY WITH THE CONSUMER CONFIDENCE**
6 **REPORT RULES?**

7 A15. The Department continues to publish annual consumer confidence reports
8 concerning water quality consistent with the requirements of the Federal and State
9 Safe Drinking Water Acts and the regulations issued under these acts. These
10 reports provide valuable information to customers and allow them to make
11 personal health-based decisions regarding their drinking water consumption.
12 Reports published by the Department since 2013 are available on the
13 Department's web site in English and Spanish. The most recent report, published
14 in the Spring of 2017 for calendar year 2016, is attached to my testimony as
15 Schedule DM-4.
16

17 **Q16. HOW DOES THE DEPARTMENT MONITOR WATER QUALITY?**

18 A16. The Department monitors treated drinking water for approximately 100 regulated
19 contaminants. These regulatory parameters are defined in federal and state rules
20 issued under the federal Safe Drinking Water Act and Pennsylvania Safe Drinking
21 Water Act, such as the Total Coliform Rule, Surface Water Treatment Rule,
22 Disinfectants and Disinfection Byproducts Rules, Lead and Copper Rule and
23 Radionuclides Rule. The Department also tests water in different stages of
24 treatment from Philadelphia's drinking water plants to make sure that treatment is
25

1 proceeding properly. Upon request, the Department tests tap water collected at the
2 homes of our customers.
3

4 **Q17. DOES THE DEPARTMENT MONITOR WATER FOR**
5 **MICROORGANISMS THAT CAN CAUSE WATERBORNE DISEASES?**

6 A17. Yes. The Water Department monitors the water treatment process for
7 microorganisms that can cause waterborne diseases and works closely with the
8 City's Department of Public Health, which monitors local hospital records in real
9 time for symptoms consistent with waterborne illnesses. The Department was one
10 of the first utilities in the nation to monitor for *Cryptosporidium*, which is a
11 microscopic organism found in rivers and lakes and which can cause
12 gastrointestinal illnesses if ingested. The Department also manages a source water
13 protection program that allows us to identify and take a proactive approach to
14 addressing sources of *Cryptosporidium* in the watersheds that supply our drinking
15 water.
16

17 **Q18. PLEASE DESCRIBE ANY ADDITIONAL ACTIVITIES UNDERTAKEN**
18 **BY THE DEPARTMENT TO TRACK AND MONITOR WATER**
19 **QUALITY?**

20 A18. The Department manages the Delaware Valley Early Warning System (EWS).
21 The goal of this system is to notify drinking water suppliers and other water
22 consumers along the Delaware and Schuylkill Rivers of spills and accidents that
23 occur upstream as quickly as possible. EWS participants include other drinking
24 water suppliers, industrial subscribers, government agencies and emergency
25 response organizations in the region. These participants provide financial and

1 technical support for EWS. EWS has several high-technology features, such as
2 computer models showing how quickly contaminants are moving downstream,
3 and providing the information necessary for quick and smart decision making.
4 Recently, the Department improved the EWS by implementing a new computer
5 model that predicts the tidal movement of water in the Delaware River. This
6 enhancement provides critical information during a spill or flood scenario and is
7 of tremendous value to the Department's Baxter drinking water treatment plant,
8 which supplies approximately 60 percent of the City with drinking water from
9 tidal portions of the Delaware River. Additional information on EWS is attached
10 to my testimony as Schedule DM-5.

11
12 Additionally, the Department maintains an extensive water quality monitoring
13 system throughout its distribution piping network. This system was expanded
14 under a \$9 million EPA grant to set up a contamination warning system.

15
16 **Q19. HAS THE DEPARTMENT RECEIVED ANY AWARDS IN**
17 **RECOGNITION OF ITS COMMITMENT TO THE PROVISION OF**
18 **HIGH QUALITY DRINKING WATER TO ITS CUSTOMERS?**

19 A19. Yes. In 2015, the PaDEP selected the Department's Early Warning System for the
20 2015 Pennsylvania Governor's Award for Environmental Excellence. We also are
21 very proud of the fact that the Department has been honored by the Partnership
22 for Safe Water with its 15-Year Director's Award in recognition of our long
23 commitment to delivering superior quality drinking water to our customers. The
24 Partnership for Safe Water is a unique cooperative effort between EPA, American
25 Water Works Association, Association of Metropolitan Water Agencies, National

1 Association of Water Companies, and Association of State Drinking Water
2 Administrators. The goal of the Partnership is to improve the quality of water
3 delivered to customers beyond regulatory requirements by optimizing treatment
4 plant performance and distribution system operation.

5
6 **Q20. ARE THERE NEW AND MORE STRINGENT FEDERAL OR STATE**
7 **DRINKING WATER REGULATIONS ON THE HORIZON THAT**
8 **MIGHT IMPACT FUTURE REVENUE REQUIREMENTS?**

9 A20. Yes. Several proposed agency actions under the federal Safe Drinking Water Act
10 and the Pennsylvania Safe Drinking Water Act may impact future revenue
11 requirements. The following are a few examples:

- 12 • **Lead and Copper Rule.** EPA is currently evaluating long-term revisions
13 to its Lead and Copper Rule and released a Lead and Copper Rule
14 Revision White Paper in October 2016. The White Paper provides
15 examples of long-term revisions currently under consideration by EPA
16 and that would impact the Department and other drinking water systems
17 that are covered by the rule. Key rule revisions under consideration
18 include: (1) more proactive lead service line replacement programs; (2)
19 more stringent corrosion control treatment requirements; (3) more robust
20 public education requirements; (4) establishment of a health based
21 household action level for lead; and (5) revisions to the monitoring
22 requirements for copper.
- 23 • **Unregulated Contaminant Monitoring Rule.** EPA published its fourth
24 Unregulated Contaminant Monitoring Rule in the Federal Register on
25 December 20, 2016. The rule will require the Department to perform

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additional monitoring for 30 chemical contaminants between 2018 and 2020.

- **Disinfection Requirement Rule.** Proposed amendments to Pennsylvania’s Disinfection Requirements Rule were published in the Pennsylvania Bulletin on February 20, 2106. The final-form rule-making was adopted by the Environmental Quality Board at its meeting on December 12, 2017, and will go into effect upon approval by the Independent Regulatory Review Commission and publication in the Pennsylvania Bulletin. The proposed amendments will impose more stringent water system requirements related to microbial protection and disinfection.
- **Safe Drinking Water General Update Rule.** Proposed amendments incorporating general update provisions to Pennsylvania’s Safe Drinking Water Rules were published in the Pennsylvania Bulletin on August 16, 2017, and will go into effect upon final-form publication. Among other things, this proposed rulemaking would: (1) amend monitoring, calibration, recording and reporting requirements for the measurement of turbidity; (2) require water suppliers to provide onsite auxiliary power sources (generators) or at least two independent power feeds from separate substations for primary components of the water system; (3) require water suppliers to update source water assessment annually; and (4) impose new annual fees on all public water systems to provide funding to the PaDEP for administration Pennsylvania’s Safe Drinking Water Program.

1 **IV. Wastewater and Water Pollution Control Services**

2

3 **Q21. PLEASE DESCRIBE THE DEPARTMENT’S SEPARATE**

4 **STORMWATER AND COMBINED SANITARY/STORMWATER**

5 **SEWERAGE FACILITIES.**

6 A21. The Department’s wastewater system encompasses both a separate storm drainage

7 system in certain areas of the City and a combined sanitary and stormwater sewer

8 system in other areas. In approximately 40% of the City there are separate sanitary

9 and storm sewers. In these areas stormwater flows into, through and is discharged

10 from separate storm sewers to receiving waters. In the remaining 60% of the City,

11 combined sewers carry both sanitary wastewater and, during and following storm

12 events, stormwater runoff. Stormwater entering the combined sewer system

13 impacts both the conveyance and water pollution control plant functions and

14 capacity. A significant portion of the flow capacity provided by the combined

15 sewers and operations at the water pollution control plants are based on the

16 demands of stormwater runoff entering the wastewater system.

17

18 **Q22. WHAT STEPS DOES THE DEPARTMENT TAKE TO PROVIDE HIGH**

19 **QUALITY WASTEWATER AND WATER POLLUTION CONTROL**

20 **SERVICES?**

21 A22. The Department conducts planning, design, construction, operation and

22 maintenance activities at its wastewater treatment plants and collector systems to

23 ensure compliance with federal, state and local regulations and provide high

24 quality wastewater and water pollution control services.

25

Q23. PLEASE DESCRIBE REGULATORY AND PERMIT REQUIREMENTS CURRENTLY APPLICABLE TO THE DEPARTMENT'S SANITARY AND COMBINED SEWER SYSTEMS UNDER THE CLEAN WATER ACT.

A23. Wastewater discharge permits are issued under the Clean Water Act and are known as National Pollutant Discharge Elimination System ("NPDES") permits. The EPA has delegated the NPDES permitting program for facilities in the Commonwealth to the PaDEP, which issues NPDES permits for facilities in Pennsylvania under the Pennsylvania Clean Streams Law. The Department has individual NPDES permits for each of its three wastewater treatment plants and their associated combined sewer overflow outfalls to rivers and creeks in the City.

PaDEP issued the current NPDES permits for the Northeast, Southeast and Southwest Water Pollution Control Plants in 2007. These permits expired in 2012. The facilities are operating under automatic extensions of the expired permits, as dictated by the policies of the PaDEP. The expired NPDES permits will remain in place until new permits are issued. The Department submitted applications for renewals to the PaDEP in 2012. The renewal permit for the Northeast Water Pollution Control Plant has been fully negotiated, and we expect that negotiations for the other two permits will proceed on similar terms.

The Department's NPDES permits contain discharge limits, monitoring schedules, sampling, analysis and reporting requirements, and numerous other operating and management requirements. Many of the requirements in the NPDES permits address Combined Sewer Overflows, commonly referred to as

1 CSOs. A CSO is an intermittent discharge from a municipal CSO outfall to waters
2 of the United States or the Commonwealth which occurs before the headworks of
3 the water pollution control plant and because of stormwater entering the combined
4 sewer system and exceeding the hydraulic capacity of the sewers or treatment
5 plants. The City owns and operates numerous CSO outfalls which are authorized
6 by the NPDES permits for its three water pollution control plants. CSOs
7 discharges are permitted only when flow in combined sewers exceeds the
8 conveyance or treatment capacities of the system during wet weather periods.

9
10 The Department's stormwater program is associated in part with addressing the
11 CSO requirements of its NPDES permits and EPA's National CSO Control
12 Policy. The NPDES permits issued in 2007 require the Department to update its
13 long-term control plan for controlling CSO discharges and to develop, propose
14 and implement capital improvement projects to provide for additional projects
15 that will reduce CSO frequency and volume. In accordance with EPA's National
16 CSO Control Policy, the permits also require the Department to take numerous
17 actions or measures designed to satisfy the Nine Minimum Controls, which are
18 described in that policy as technology-based actions designed to reduce CSO
19 pollutant discharges and address their effects on receiving waters. The following
20 are some examples of the specific actions or measures required by the permits and
21 implemented by the Department to comply with the Nine Minimum Controls in
22 EPA's National CSO Control Policy, as set forth in the NPDES permits:

- 23 • A comprehensive Geographic Information System (GIS) of the sewer
24 system;

- A sewer assessment program with inspections using closed circuit television;
- A comprehensive monitoring and modeling program for the sewer system;
- An Industrial Pretreatment Program to regulate industrial waste discharges into the sewer system;
- Minimum inlet cleaning requirements;
- Funding and operation of a program to remove large debris from streams and perform in-stream cleanup work;
- Operation of a vessel to remove floatable debris from tidal portions of CSO receiving waters;
- Public education and outreach programs, including continued support for the Fairmount Water Works Interpretive Center and watershed partnership programs; and
- An internet-based notification system that provides real-time information on water quality of the Schuylkill River.

Q24. PLEASE DESCRIBE REGULATORY AND PERMIT REQUIREMENTS CURRENTLY APPLICABLE TO THE DEPARTMENT’S MUNICIPAL SEPARATE STORM SEWER SYSTEM UNDER THE CLEAN WATER ACT.

A24. The Clean Water Act requires municipalities with municipal separate sewer systems serving populations of 100,000 or more to obtain NPDES permits for their stormwater discharges. EPA defines a municipal separate storm sewer system (commonly referred to as an “MS4”) as a conveyance or system of conveyances that is: (i) owned by state, city, town, village or other public entity

1 that discharges to waters of the United States, (ii) designed or used to collect or
2 convey stormwater; (iii) not a combined sewer and (iv) not part of a sewage
3 treatment plant or publicly owned treatment work. In Pennsylvania, this
4 requirement of the Clean Water Act is administered by PaDEP under its MS4
5 Program. PaDEP issues NPDES MS4 permits under the Pennsylvania Clean
6 Streams Law and its delegated authority from EPA.

7
8 PaDEP issued the current NPDES MS4 permit for the City's separate storm sewer
9 system in 2005 and amended the permit in 2006. The permit expired in 2010. As
10 required under PaDEP regulations, the Department applied for renewal of this
11 permit to PaDEP on March 29, 2010. PaDEP has made a tentative determination
12 to issue the new permit and published a notice of its determination and a request
13 for public comment in the Pennsylvania Bulletin on July 29, 2017. Comments
14 were submitted by four parties: Delaware Riverkeeper, City of Philadelphia Parks
15 and Recreation, PennFuture/NRDC and EPA.

16
17 The Department's current NPDES MS4 permit establishes numerous permit
18 conditions and requires stormwater management practices to ensure water quality
19 standards and designated uses are attained in our rivers and creeks. The following
20 are some specific programs administered by the Department as required by the
21 conditions and requirements of its current NPDES MS4 permit:

- 22 • **Illicit discharge detection and elimination program.** The Department
23 administers this program to detect, investigate and abate illicit connections
24 and improper discharges to the MS4.
- 25 • **Industrial facility program.** The Department administers a permit

1 program to control stormwater from industrial activities discharged to the
2 MS4.

- 3 • **Construction site runoff controls.** The Department implements and
4 enforces this program to reduce runoff pollution in stormwater runoff from
5 construction activities and development and redevelopment projects.
- 6 • **Post-Construction Stormwater Management Program.** The
7 Department implements and enforces this program which requires post-
8 construction stormwater management from new development and
9 redevelopment projects.
- 10 • **Public Education and Outreach.** The Department administers a public
11 education and outreach program that targets a diverse audience and
12 includes outreach activities and educational materials about the impacts of
13 stormwater discharges and steps the public can take to reduce or eliminate
14 contaminated stormwater runoff.

15
16 **Q25. PLEASE DESCRIBE THE DEPARTMENT’S GREEN CITY, CLEAN**
17 **WATERS PROGRAM AND ITS CONSENT ORDER AND AGREEMENT**
18 **WITH PADEP.**

19 A25. The PaDEP and the Water Department signed the Consent Order and Agreement
20 (COA) on June 1, 2011. A copy of the COA is included with the filing as PWD
21 Exhibit 7. The COA requires the Department to implement its updated long-term
22 control plan to control CSO discharges, which the Department submitted to
23 PaDEP in 2009. The Department refers to its updated long-term control plan as
24 the “*Green City, Clean Waters*” program. Under the program, the City will invest
25 in green and traditional infrastructure, including wastewater treatment facility

1 enhancements, interceptor pipe lining and collection system improvements, to
2 mitigate CSOs and enhance the quality of local waterways.

3
4 As required under the COA, by the year 2036 (year 25 of the COA), the *Green*
5 *City, Clean Waters* program seeks to eliminate and remove the mass of pollutants
6 that otherwise would be removed by the capture of 85% by volume, City-wide, of
7 CSOs. The COA requires interim milestones at the end of the fifth, tenth, fifteenth
8 and twentieth years in four categories: (1) Total Greened Acres from green
9 stormwater infrastructure projects; (2) Overflow Reduction Volume; (3) Miles of
10 Interceptor Lined; and (4) Wastewater Treatment Plant Upgrades.

11
12 The COA uses “Greened Acres” as a metric that accounts for the conversion of
13 highly impervious urban landscape through the implementation of projects that
14 reduce stormwater runoff. A Greened Acre is a quantitative expression of the
15 volume of stormwater that can be managed by a green stormwater infrastructure
16 project. One Greened Acre is equivalent to one inch of managed stormwater
17 runoff from one acre of impervious drainage area.

18
19 The COA also includes significant penalties for non-compliance with the various
20 5-year milestones. Penalties start at \$25,000 per month for each violation (for the
21 first 6 months) and increase up to \$100,000 monthly for uncured violations of 13
22 months or more.

23
24 The Department anticipates that over the next 20 years, compliance with the COA
25 will significantly increase capital and operating expenditures related to *Green*

1 *City, Clean Waters*. Looking ahead to the 10th-year milestone, the Department
2 continues to review program cost and delivery to optimize the program while
3 satisfying the necessary regulatory requirements. As of the most recent
4 projections, the total cost of the 25-year program is approximately \$4.5 billion, of
5 which approximately \$3.5 billion are capital related costs and \$1 billion are
6 operation and maintenance costs.

7
8 The Department has completed its fifth year of the 25-year COA and met
9 applicable fifth year milestones. An additional 1,310 greened acres and 334
10 million gallons of CSO reduction are required by June of 2021 to achieve the
11 required year ten milestone of 2,148 greened acres and 2,044 million gallons of
12 CSO reduction.

13
14 **Q26. WHY IS THE COMBINED SEWER OVERFLOW PROGRAM AN ISSUE**
15 **IN THE RATE PROCEEDING?**

16 A26. *Green City, Clean Waters* will require a significant increase in capital and
17 operating expenditures over the next 19 years, as well as the focus of staff and
18 management on tracking, measuring and reporting progress toward compliance
19 with the Consent Order Agreement requirements. As described in the testimony
20 of Stephen Furtek in PWD Statement No. 3, the *Green City Clean Waters* program
21 is an integral part of the Capital Improvement Program as to which there are
22 related financing costs reflected in the revenue requirements for FY 2019-2021.
23
24
25

1 **Q27. HAS THE DEPARTMENT RECEIVED ANY AWARDS OR**
2 **RECOGNITIONS REGARDING THE OPERATION OF ITS WATER**
3 **POLLUTION CONTROL FACILITIES AND IMPLEMENTATION OF**
4 **THE GREEN CITY CLEAN WATERS PROGRAM?**

5 A27. Yes. The National Association of Clean Water Agencies (NACWA) gives
6 Platinum Awards to facilities that achieve 100% compliance with permits over a
7 consecutive five-year period. Our Northeast, Southeast and Southwest
8 Wastewater Control Plants all received Platinum Awards for perfect compliance
9 records over the past five years.

10
11 *Green City, Clean Waters* and the COA also have received national recognition
12 because they represent a shift from typical CSO programs and agreements. As
13 noted by Stephen Furtek in PWD Statement No. 3, the approach of *Green City,*
14 *Clean Waters* focuses on controlling pollution at its source and improving water
15 quality by restoring the natural hydrologic cycle in the urban environment.

16
17 **Q28. IS THE DEPARTMENT COMMITTED TO CONTINUING PROGRAMS**
18 **THAT PRESERVE AND IMPROVE LOCAL WATER QUALITY?**

19 A28. Yes. Prospectively, the Department is committed to continuing its investments in
20 protecting the region's water environment, including cost-effective operation of
21 its wastewater system at levels in full compliance with regulatory permits.
22 Pursuant to the COA, the Department will continue to use green and traditional
23 infrastructure technologies to substantially mitigate CSOs and enhance the quality
24
25

1 of local waterways, as well as make certain enhancements to its wastewater
2 treatment plants and sewers.

3
4 **Q29. WILL THE DEPARTMENT EXPERIENCE HIGHER OPERATING**
5 **COSTS BECAUSE OF REGULATORY REQUIREMENTS RELATED TO**
6 **WATER QUALITY DURING THE RATE PERIOD?**

7 A29. Yes. The requirements of the NPDES permits for the three wastewater treatment
8 plants will continue a trend of higher annual operating costs for the Department.
9 These expenditures, along with the ongoing operating and maintenance costs for
10 the *Green City, Clean Waters* program, are among those projected for the Rate
11 Period and together with other operating and financial costs contribute to the need
12 for the requested rate relief.

13
14 **V. Customer Assistance and Customer Service Initiatives**

15
16 **Q30. PLEASE DESCRIBE THE CUSTOMER ASSISTANCE PROGRAMS AND**
17 **CUSTOMER SERVICES PROVIDED BY THE DEPARTMENT.**

18 A30. The Department, in conjunction with the Water Revenue Bureau, provides rate
19 discounts for certain categories of special customers. These rate discounts, as well
20 as payment plans and grant programs for customers having problems paying their
21 water bill, are addressed in the testimonies of Michelle Bethel and Ravonne A.
22 Muhammad (PWD Statement No. 7), Raftelis Financial Consultants (PWD
23 Statement No. 8). and Black & Veatch (PWD Statement No. 9A).

1 In addition, the Department directly administers the following customer
2 assistance programs.

- 3 • **Homeowners Emergency Loan Program or “HELP.”** HELP is a no-
4 interest, installment payment loan program available to homeowners who
5 need to make emergency repairs of defective water service and sewage
6 drainage pipes. This program, which began in 1991, provides emergency
7 loans and allows customers to avoid shut-off of service because of a notice
8 of defect issued by the City. In Fiscal Year 2017, the Department provided
9 approximately \$6.1 million in HELP loans for approximately 1,300 water
10 and sewer repair jobs
- 11 • **Conservation Assistance Program.** The Conservation Assistance
12 Program provides conservation devices and education to low-income
13 customers (at or below 150% FPL) targeting 25% or greater savings for
14 participants. Funding is budgeted at approximately \$650,000 annually.
- 15 • **Cross Connection Abatement Program.** This program is a State-
16 mandated program under which the Department is required to investigate
17 and impose appropriate abatement requirements for sanitary drainage lines
18 that are connected to storm sewers. When the Department identifies a
19 cross connection at a residential property, it is required to bear the cost of
20 abatement of the cross connection. In Fiscal Year 2017, the Department
21 spent over \$300,000 abating such cross connections.
- 22 • **Basement Backflow Prevention Program.** The Department established
23 the Basement Backflow Prevention Program to alleviate flooding that
24 occurs when water from our combined sewer system backs up into
25 basements after heavy rains through fixtures such as toilets or floor drains.

1 Under this program, the Department pays for the purchase and installation
2 of backflow prevention devices which prevent sewage from a surcharged
3 sewer from backing up into basements. The Department completed
4 approximately 26 repairs at a total cost of about \$90,0000 under this
5 program in Fiscal Year 2017.

- 6 • **Customer Service Provided by PWD's Bureau of Laboratory**
7 **Services.** The Department's Bureau of Laboratory Services operates a
8 state-of-the art laboratory and provides assistance to customers by: (i)
9 testing tap water collected from customer's homes in response to
10 complaints about taste, odor and appearance of their tap water; (ii)
11 responding to detailed information requests about water quality from
12 customers with special needs for such information, e.g. industrial users
13 with water sensitive processes, bottlers, hospitals, dialysis centers, and
14 brewers, among others; and (iii) testing of water in flooded basements to
15 help customers determine the source of the water, i.e. groundwater or
16 water from a leaking water pipe or sewer.
- 17 • **Stormwater Management Incentives Program.** The Department offers
18 several programs providing technical assistance and financial incentives
19 to its stormwater customers. These programs are described in the
20 testimony of Erin Williams (PWD Statement No 6).

1 **Q31. WHAT STEPS HAS THE DEPARTMENT TAKEN IN RECENT YEARS**
2 **TO IMPROVE CUSTOMER ASSISTANCE PROGRAMS AND**
3 **ENHANCE THE QUALITY OF CUSTOMER SERVICE?**

4 A31. Since the last base rate proceeding, the Department has implemented the
5 following initiatives specifically designed to improve customer assistance
6 programs and customer service.

7
8 First, in July 2017, the Water and Revenue Departments began implementing the
9 Tiered Assistance Program, also known as TAP. TAP is an affordability program
10 for low-income customers and those with special hardships that helps to reduce
11 their monthly water bill. It provides customers with consistent monthly bills based
12 on their household income. The Board set rates for this program in the last base
13 rate proceeding. When we began implementing TAP, we also began allowing
14 customers to apply for all assistance programs on-line using a single application.
15 Additional information on TAP is addressed in the testimonies of Michelle Bethel
16 and RaVonne A. Muhammad (PWD Statement No. 7) and Raftelis Financial
17 Consultants (PWD Statement No. 8).

18
19 Second, although the City is in full compliance with State and Federal
20 requirements related to lead in drinking water, the Department began
21 implementing several new programs in 2016 to address growing public concern
22 after elevated levels of lead were found in the drinking water of residences in
23 Flint, Michigan, which had brought increased attention to the challenge of lead in
24 drinking water across the country. These new programs included the following;
25

- 1 • **Full Lead Service Line Replacement.** Beginning in Fiscal Year 2017,
2 the Department started to replace customer-owned lead water service
3 lines discovered during City water main replacement jobs upon the
4 owner's consent at no cost to the customer.
- 5 • **Lead Loans.** In Fiscal Year 2017, the Department also expanded the
6 Homeowners Emergency Loan Program to offer interest free loans to all
7 customers who reside on blocks where water mains are not being replaced
8 and who are interested in replacing their lead water service lines.
- 9 • **Home Plumbing Audits.** The Department arranged for our current
10 conservation service provider to begin checking for lead service lines
11 when performing home plumbing audits for low income customers. This
12 inspection service supplements our ongoing efforts to help customers
13 identify lead pipes in their homes upon a request to the Department or
14 during routine service visits.
- 15 • **Public Education.** The Department expanded and improved our
16 customer outreach and education program to effectively and proactively
17 communicate drinking water lead risks and provide information on
18 actions that customers can take to reduce lead exposures. Specific
19 initiatives include: (i) creating a lead information page on our web site
20 that includes new fact sheets about using HELP loans to replace lead
21 service lines, daily cleaning tips on how to clean lead from home drinking
22 water pipes, and information on how customers can check their water
23 service lines for lead; (ii) translating fact sheets into Spanish and
24 Portuguese; (iii) including bill stuffers about lead in water bills; and (iv)

25

1 offering presentations to community groups. Some of the new fact sheets
2 are attached to my testimony as Schedule DM-6.
3

4 Third, since the last rate proceeding we have continued to hold quarterly
5 stakeholder meetings of the Residential Customer Assistance and Service
6 Committee (R-CAS). The mission of R-CAS is to: (1) to assist WRB and PWD
7 in review of their current and proposed programs and provide input on how we
8 may do better; (2) ensure that we are doing a good job in balancing the interest of
9 many in a fair and cost-effective way; and (3) to provide feedback on the proposed
10 revisions to programs and services.
11

12 Fourth, we contracted with a nationally-renowned academic research team to
13 conduct comprehensive customer satisfaction and construction project perception
14 surveys. The most recent survey was completed in 2017 and focused on three
15 areas: (1) general customer satisfaction; (2) construction projects; and (3)
16 customer assistance programs, including the Homeowner's Emergency Loan
17 Program.
18

19 Fifth, in April 2017, we began holding Town Hall meetings to bring information
20 about PWD and WRB services directly to our customers. These meetings
21 generally include a short presentation on PWD and services available and an
22 exchange of information on topics such as billing, HELP loans, customer
23 assistance programs, lead service lines, capital projects, customer service related
24 issues and *Green City, Clean Waters*.
25

1 Sixth, we recently published a Homeowner's Guide which provides customers
2 with information on how to get the most out of PWD and WRB services, including
3 information on water quality, how to become a customer, billings, plumbing
4 issues, customer assistance programs, service interruptions, and protecting our
5 waterways, as well as a quick reference page with contact information. The
6 Homeowner's Guide is incorporated by reference in our filing with the Rate
7 Board.

8
9 Seventh, the Department has been working closely with the Water Revenue
10 Bureau to merge our respective Call Centers. Customers will be able to call one
11 phone number for emergency, billing, inlet cleaning, water in the basement, etc.
12 calls. The goal is to improve customer experience, drive down wait times and
13 achieve first call resolution. The merger should be completed in early 2018.

14 15 **VI. Future Strategic Planning**

16
17 **Q32. WHAT ARE SOME OF THE FUTURE STRATEGIC PLANNING**
18 **INITIATIVES UNDERWAY BY THE DEPARTMENT TO IMPROVE**
19 **EFFICIENCY AND PROVIDE FUTURE BENEFITS TO CUSTOMERS?**

20 **A32.** As the Department strives to be one of America's model 21st century urban water
21 and wastewater utilities, future strategic planning and innovative technologies
22 play a critical role in all services. The Department has undertaken future strategic
23 planning by developing 25-year Water and Wastewater Master Plans, developing
24
25

1 a utility-wide strategic energy plan, and initiating a Climate Change Adaptation
2 Program.

3
4 **Q33. PLEASE DESCRIBE THE DEPARTMENT'S WASTEWATER MASTER**
5 **PLAN.**

6 A33. The Wastewater Planning Program developed a 25-year Master Plan that
7 incorporates the regulatory requirements contained in the COA, connecting the
8 collection system and treatment facilities holistically, and looks beyond current
9 regulatory drivers to envision the future of the utility. The Master Plan is expected
10 to be updated every 5 years to ensure that the wastewater system meets regulatory
11 requirements and any changes in population projections. The Wastewater Master
12 Planning Program's data and findings will help refine the Water Capital
13 Improvement Program, prioritize capital projects and inform facility planning as
14 it relates to potential water quality regulations, resource recovery, and process
15 renewal technologies. Facility major asset inspection programs are under
16 development to ensure that the condition of infrastructure is known and that
17 related costs are reflected in the Water Capital Improvement Program.

18
19 **Q34. PLEASE DESCRIBE THE DEPARTMENT'S WATER MASTER**
20 **PLANNING INITIATIVE.**

21 A34. The Water Planning Program is currently developing a 25-year Water Master Plan
22 that will document existing conditions and evaluate water system data and trends
23 and is expected to be completed in the Spring of 2018. The Water Master Plan
24
25

1 will assist the Department in developing the Water Capital Improvement Program
2 and prioritizing capital projects and related water planning work.

3
4 **Q35. PLEASE DESCRIBE HOW THE CITY PURCHASES ENERGY.**

5 A35. The City of Philadelphia's Energy Office, within the Mayor's Office of
6 Sustainability, manages the procurement of energy for all City departments. The
7 mission of the Energy Office is to:

- 8 • strategically procure cost-effective, reliable, safe clean energy and
9 conventional energy systems for City government;
- 10 • promote energy conservation and efficiency within City facilities; and
- 11 • develop and implement projects and programs that promote the efficient use
12 of energy and reduce the City's environmental impact.

13
14 In June 2017, the Mayor committed to transitioning the City to clean energy,
15 establishing another priority for the Energy Office's strategic procurement of
16 energy. In September 2017, the Energy Office published a Municipal Energy
17 Master Plan, which provides a roadmap of how Philadelphia City government will
18 lead by example to reduce carbon emissions. The City's Municipal Energy Master
19 Plan is incorporated by reference in the Department's filing with the Rate Board.

20
21 **Q36. PLEASE PROVIDE SOME EXAMPLES OF THE DEPARTMENT'S**
22 **ENERGY-RELATED ACHIEVEMENTS.**

23 A36. The Department has emerged as a leader in energy efficiency and conservation at
24 City facilities with the early implementation of a Department-wide energy plan
25 that aligns with the City's current goals and strategies. The Department's Utility

1 Wide Strategic plan outlines the Department's core goals and is attached to my
2 testimony as Schedule DM-7.

3
4 Some specific examples of energy efficiency and conservation projects
5 implemented by the Department over the past decade include the following:

- 6 • The Aircraft Deicer Co-Digestion Project, which began in 2008 and
7 involves feeding used aircraft deicer fluids from the Philadelphia
8 International Airport to the anaerobic digesters at the Southwest Pollution
9 Control Plant. This practice increases the production of energy-rich
10 methane gas that we use as fuel for plant operations and reduce our
11 dependence on non-renewable energy sources.
- 12 • Solar Panel Installation at the Southeast Water Pollution Control Plant in
13 2011.
- 14 • The Cogeneration facility at the Northeast Water Pollution Control Plant,
15 which came on line in 2013. This facility captures methane generated from
16 the existing sewage treatment process. The captured biogas provides 85%
17 of the electrical requirements for plant operations. Additionally, the heat
18 recovered from the engines replaces some of the fuel required to operate
19 the plant's heating systems.

20
21 **Q37. PLEASE DESCRIBE THE DEPARTMENT'S CLIMATE CHANGE**
22 **ADAPTATION STRATEGY.**

23 A37. Impacts from climate change pose a significant challenge to water utilities across
24 the nation. PWD has created the Climate Change Adaptation Program (CCAP) to
25 understand the impacts that climate change will have on our drinking water,

1 wastewater and stormwater systems and to develop cost-effective adaptation
2 strategies to minimize those impacts. CCAP will identify strategic upgrades,
3 design recommendations and planning criteria to inform how the Department can
4 minimize the impact of climate change and ensure the continued delivery of clean,
5 safe drinking water and environmentally progressive wastewater and stormwater
6 services for our customers. A fact sheet providing additional information on this
7 program is attached to my testimony as Schedule DM-8.

8
9 **VII. Innovative Technologies**

10
11 **Q38. DOES THE DEPARTMENT USE NEW AND INNOVATIVE**
12 **TECHNOLOGIES TO OPERATE AND MAINTAIN ITS WASTEWATER**
13 **AND WATER SYSTEMS?**

14 A38. Yes. The Department's use of innovative technologies is illustrated in my
15 testimony about the Early Warning System. As explained by Donna Schwartz in
16 her testimony, the Department takes advantage of innovative technologies to
17 address issues such as water accountability and computerized tracking of
18 operation and maintenance activities.

19
20 **VIII. Conclusion**

21
22 **Q39. HOW IS THE DEPARTMENT REGARDED AMONG MUNICIPAL**
23 **WATER UTILITIES?**

24 A39. The Department is recognized as a leader among municipal water utilities because
25 of our long history of providing safe drinking water and high-quality wastewater

1 treatment and water pollution control services, our commitment to improving
2 customer service, our efforts to be at the forefront of energy efficiency and new
3 technologies, our environmental stewardship and our investment in Philadelphia
4 neighborhoods. Of course, we always seek ways to improve and better serve the
5 City and our customers.

6
7 **Q40. DOES THIS CONCLUDE YOUR PREPARED DIRECT TESTIMONY?**

8 A40. Yes, it does.
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**Schedule DM-1: Resume of
Debra A McCarty**

Debra Anita McCarty

ARAMARK Tower
1101 Market Street- 5th Floor
Philadelphia, Pennsylvania 19107
Office Phone: 215-685-6103

Education:

The Johns Hopkins University, Baltimore, Maryland. Received Bachelor of Engineering Sciences in May, 1979 with a major in Environmental Engineering

Experience:

January 2016 to Present

Philadelphia Water Department, Commissioner. Responsible for the oversight of the entire water, sewer and stormwater utility.

April 2004 to January 2016

Philadelphia Water Department, Deputy Commissioner/Director of Operations. Responsibilities included oversight of the operation and maintenance of the water and wastewater utilities including three water plants, three wastewater plants and a biosolids recycling facility. Also included in my responsibilities is the operation and maintenance of 3,100 miles of water mains, 3,500 miles of sewers, 79,000 stormwater inlets, 25,000 fire hydrants and water and wastewater pumping stations, throughout the City. I also oversee the supply of water and wastewater services to suburban contract customers.

October 1999 to April 2004

Philadelphia Water Department, Chief of Wastewater Treatment. Responsible for Philadelphia's three wastewater treatment plants with a combined average daily treatment capacity of 522 million gallons/day, a combined operating budget of \$34.7 Million and approximately 330 employees. Set overall goals and objectives for facilities; insured compliance with NPDES permits under the Clean Water Act administered by Pa DEP; insured compliance with Title V and Synthetic Minor permits under the Clean Air Act Amendments administered by Air Management Services; oversaw capital and operating budgetary issues; coordinated efforts between plants and PWD units, other city agencies and regulators; various administrative tasks.

July 1993 to October 1999

Philadelphia Water Department, Southwest Water Pollution Control Plant, Plant Manager. Overall responsibility for this 200 million gallon/day wastewater treatment plant with a full staffing level of 135 employees. Responsibilities entailed directing and providing technical guidance to process engineers and operations staff to insure compliance with NPDES permit and Clean Air Act Amendment requirements; directed and provided technical guidance to maintenance staff to insure facility was properly maintained and in a cost effective manner (This included selecting and implementing a computerized maintenance management system and initiation of predictive maintenance practices to prolong equipment life and minimize downtime); directed an administrative

staff whose responsibilities included payroll, procurement of parts and services, processing payments for purchase orders, developing annual budgets, tracking expenditures to remain within budget and coordination of training of plant staff; successfully led plant efforts to satisfy various obligations under an EPA Consent Decree; developed and implemented a facility budget which was competitive with contract operations and resulted in significant savings for the rate payers; worked with AFSCME DC #33 to achieve many of these goals.

May 1989 to July 1993

Philadelphia Water Department, Northeast Water Pollution Control Plant, Process Manager. Had direct responsibility for control of plant processes at this 210 million gallon/day facility. This included insuring compliance with NPDES permit requirements, minimizing malodor emissions, implementing operational changes and special projects. Assisted in preparation of budget; recommended capital projects then assisted designers with preparation and review of plans and specifications; performed plant manager duties in his absence; supervised a staff of two sanitary engineers and two water quality technicians.

May 1984 to May 1989

Philadelphia Water Department, Northeast Water Pollution Control Plant, Sanitary Engineer for Plant Operations Group. Responsible for coordination of eight construction projects and related activities to minimize impact to plant processes; startup, operation and troubleshooting of facilities after construction completion; implementation of an odor control program to address court ordered mandates (this effort contributed to the successful settlement of the Federal lawsuit filed by the community).

August, 1982 – May 1984

Philadelphia Water Department, Northeast Water Pollution Control Plant, Sanitary Engineer in Treatment Headquarters Group. Responsible for various plant related projects and outside pumping stations. Responsibilities included interfacing with the Operations, Maintenance and Construction Groups to start-up and operate new facilities. (Primary and Final Sedimentation Tanks, Preliminary Treatment Building and Chlorination Facilities); writing and administration of several requirements contracts; providing assistance to Department's training consultant for training coordination and preparation of system operating manuals; administration of plant dust control program; primary community contact including responding to their problems and concerns; Plant Standby Engineer every six weeks.

November, 1979 to March, 1982

Huth Engineers, Inc., Lancaster, Pennsylvania, Project Engineer in the Environmental Group. Assisted in, and responsible for various water and wastewater related projects. Responsibilities included preparation of Operation and Maintenance manuals for sewer systems; evaluation of water storage alternatives; responsible for preliminary development of sludge composting facility for a major plant; participated in preparation of major components of several "201" Facilities Plans; dealt with federal, state and local agencies on behalf of various municipalities; Engineer for Jackson Township for various projects. Also attended conferences relative to sludge composting.

**Activities and
Interests:**

Active in my local civic association, the Powelton Village Civic Association, and recently served as President. Serve on the Board of Directors of the Mantua Powelton Alliance and as Secretary on the Board of Directors for The Philadelphia Singers. Enjoy gardening (particularly native & wildlife friendly habitats), fishing, cooking, listening to various music genres & attending concerts, bicycling, hiking, competitive swimming and my dog.

**Professional
Affiliations:**

Water Environment Federation; Eastern Pennsylvania Water Pollution Control Operators Association, Inc.

References:

Furnished Upon Request

Schedule DM-2: Green Stormwater Infrastructure Tools

Overview

Green City, Clean Waters promotes the use of green stormwater infrastructure throughout the city. These green tools use plants, trees and stone to filter store and manage stormwater in a smart and cost-effective way.



How do These Green Tools Work?

When it rains, stormwater runs off streets and sidewalks into a green stormwater infrastructure (GSI) tool. Water soaks into a stone bed below ground where it is absorbed by plant roots and released through transpiration. Some of the water evaporates from the surface and excess water is slowly released back into the sewer system. Storing water in these GSI systems significantly reduce pollutants entering our creeks and rivers.

What are the Benefits?

- Improves water quality by reducing combined sewer overflows*
- Improves the health of our stream banks and aquatic life
- Enhances the beauty of our streets and neighborhoods
- Promotes a safer and healthier community
- Reduce the urban heat island effect (city's temperature)
- Improves air quality

*Combined sewer overflows occur during heavy rainstorms when treatment plants can't clean all the water running through the system so polluted stormwater and sanitary waste overflow into local rivers.

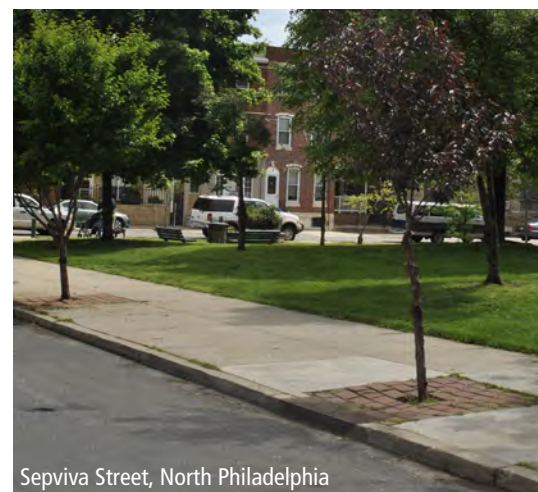
Stormwater Tree Trenches

A stormwater tree trench is a system of trees connected by an underground infiltration structure. On the surface, a stormwater tree trench looks similar to a series of street tree pits. However, under the sidewalk a perforated pipe distributes water throughout the trench.



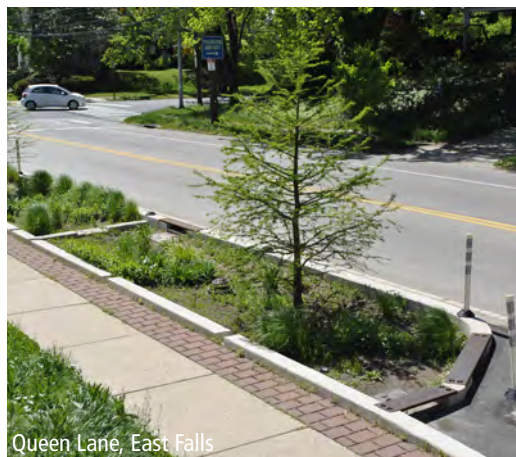
Stormwater Trees

Stormwater trees look like typical street trees, but they have a deep stone pit to help manage stormwater. While a tree trench has multiple trees in one trench, stormwater trees are planted individually.



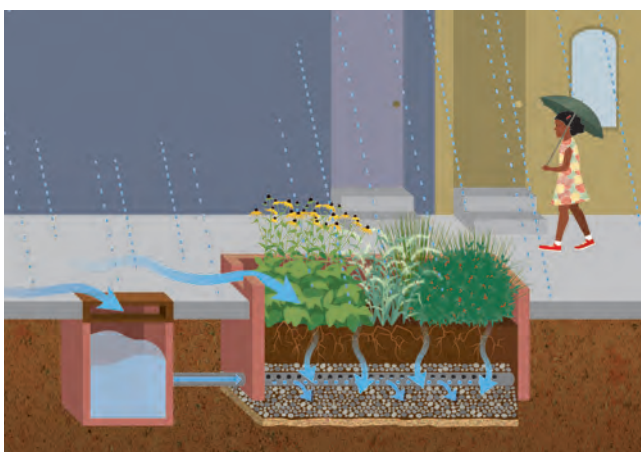
Stormwater Bump-outs

A stormwater bump-out is a landscaped extension of the curb that protrudes into the street at an intersection. A bump-out has a layer of stone that is topped with soil and plants to capture stormwater runoff. In addition to managing stormwater, bump-outs can calm traffic and make intersections safer for pedestrians.



Stormwater Planters

Stormwater planters manage stormwater runoff from the street and sidewalk. They sit below the sidewalk and are filled with vegetation, soil and stone. A stormwater inlet collects water from the street and directs it into the planter where plant roots soak it up. The planter also has small openings to catch stormwater following from the sidewalk.



Rain Gardens

A rain garden is a planted shallow depression designed to catch and filter stormwater runoff from a downspout or nearby paved surface. The plant species are selected for their ability to thrive in extremely wet and dry weather. Rain gardens filter pollutants, replenish groundwater and provide habitat for animals. They are one of the simplest and effective ways to manage stormwater.



Permeable Materials

Special materials, such as porous asphalt or concrete, and permeable pavers or rubber playgrounds, allow water to pass through their surfaces into the stone and ground below. These materials slow, redirect and filter water through the soil instead of overwhelming sewers. They can be used in streets, around homes or in schoolyards.



**Schedule DM-3: Philadelphia
Renewable Biofuels**



Schedule DM-3

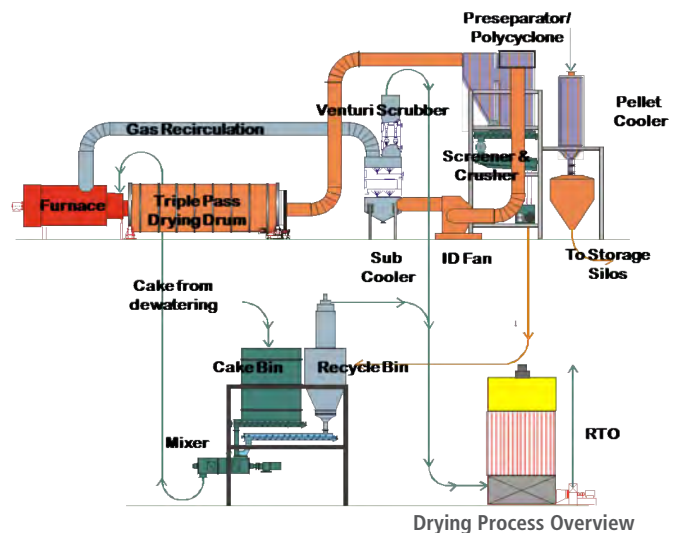
Philadelphia Renewable Bio-Fuels

Thermal Drying Facility

The Philadelphia Renewable Bio-Fuels Facility produces quality biosolids pellets for sale in organic fertilizer and renewable fuel markets.

The Biosolids Recycling Center (BRC)

In 2005, after extensive review and a lengthy competitive process, the Water Department recommended that the City enter into a long-term contract with a private consortium to upgrade the BRC to an indoor heat-dried pelletizing process. Headed by industry leader Synagro, the Philadelphia Biosolids Services (PBS) would operate the existing BRC for three to five years while building a Class A biosolids thermal drying facility at the site. Subsequently, PBS would operate the new plant for 20 years, with a five year extension option. PBS took over operation of the BRC in October 2008, and the transition to private operation has been very successful. Full Class A pellet production of biosolids began in February 2012.



New Drying Operations Facilities

- New Odor Control Scrubber on Dewatering Building
- Thermal Drying Building with 2 Andritz DDS 110 Dryers
- Odor & Emission Control on Drying Building
- Digester Gas Pipeline from Southwest Plant
- New Electrical Substation
- 3 Product Silos



Philadelphia Dewatering Operations

- 15 Sludge Feed Pumps
- 10 Centrifuges
- 15 Polymer Solution Injection Pumps
- 3 Centrate Pumps
- 10 Screw Conveyors
- 2 Cake Belt Conveyors



**Schedule DM-4: Drinking
Water Quality Report (2016)**



2016 Drinking Water Quality Report

published Spring 2017

This report is produced for you as a requirement
of the Federal Safe Drinking Water Act.

NOTE: Industrial and commercial customers,
including hospitals, medical centers and health
clinics, please forward this report to your
Environmental Compliance Manager.

PWD's Public Water System Identification #PA1510001

Table of Contents

- 2 Sharing This Report
- 2 People with Special Health Concerns
- 3 A Message from the Philadelphia Water Department's Commissioner
- 4 Where Does Philadelphia's Drinking Water Come From?
- 5 Safeguarding the Water You Drink
- 6 Lead in Drinking Water
- 9 Partnership for Safe Water
- 10 Pharmaceuticals and Source Water
- 10 *Cryptosporidium* and *Giardia*
- 11 Schuylkill and Delaware River Source Water Protection Plans
- 12 Water Treatment Diagram
- 14 Monitoring Water Quality: What Do We Look For?
- 15 Glossary
- 16 2016 Drinking Water Quality Results
- 19 Free rain barrels? Rain Check is that... and so much more
- 20 Fairmount Water Works: Innovation and Education Continues...
- 22 Clean Water Begins and Ends with You

Sharing This Report

Please share this report with all people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools and businesses). You can do this by posting this notice in a public place or distributing copies by hand and mail.

To receive a printed copy of this report, please email: waterquality@phila.gov.

Para obtener una copia del informe en Español sobre los resultados más recientes de la calidad del agua publicado por el Departamento de Agua de Philadelphia, llame al 215.685.6300.

People With Special Health Concerns

Some people may be more vulnerable to contaminants 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 HIV/AIDS and other immune system disorders, some elderly and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers.

U.S. Environmental Protection Agency (EPA)/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline: 800.426.4791.

A Message From the Philadelphia Water Department’s Commissioner

Every year brings challenges and successes, and 2016 demonstrated that the Philadelphia Water Department (PWD) is a strong organization, thanks to our over 2,000 dedicated employees.

This report, published in the spring of 2017, includes water quality information for the 2016 calendar year. The EPA requires all water utilities to produce and distribute water quality reports on an annual basis. We take this opportunity to introduce you to a variety of programs and operations that ensure the holistic stewardship of our drinking water sources — the Schuylkill and Delaware rivers.

The water that leaves our treatment plants is better than what is required by the U.S. Environmental Protection Agency (EPA). Our water is monitored 24 hours a day, 7 days a week to ensure that it consistently remains of the highest quality. Our team of experienced scientists and engineers test and treat our water for nearly 100 chemicals, and this annual Drinking Water Quality Report explains what we look for, and what we found.

We hope you take the time to look at all the information in this report. We value our relationship with you, our customers, so please contact us if you have any questions.

PWD’s drinking water quality is better than all drinking water standards developed by the EPA to protect public health.



Debra McCarty
Water Commissioner

The Philadelphia Water Department is an active member of:

- | | | |
|--|--|---------------------------------------|
| American Water Resources Association | National Association of Clean Water Agencies | U.S. Water Alliance |
| American Water Works Association | Partnership for the Delaware Estuary | Water Environment Federation |
| Partnership for Safe Water | Schuylkill Action Network | Water Environment Research Foundation |
| American Public Works Association | Schuylkill River Restoration Fund | Water Research Foundation |
| Association of Metropolitan Water Agencies | Tookany/Tacony-Frankford (TTF) Watershed Partnership | |
| Clean Water American Alliance | | |

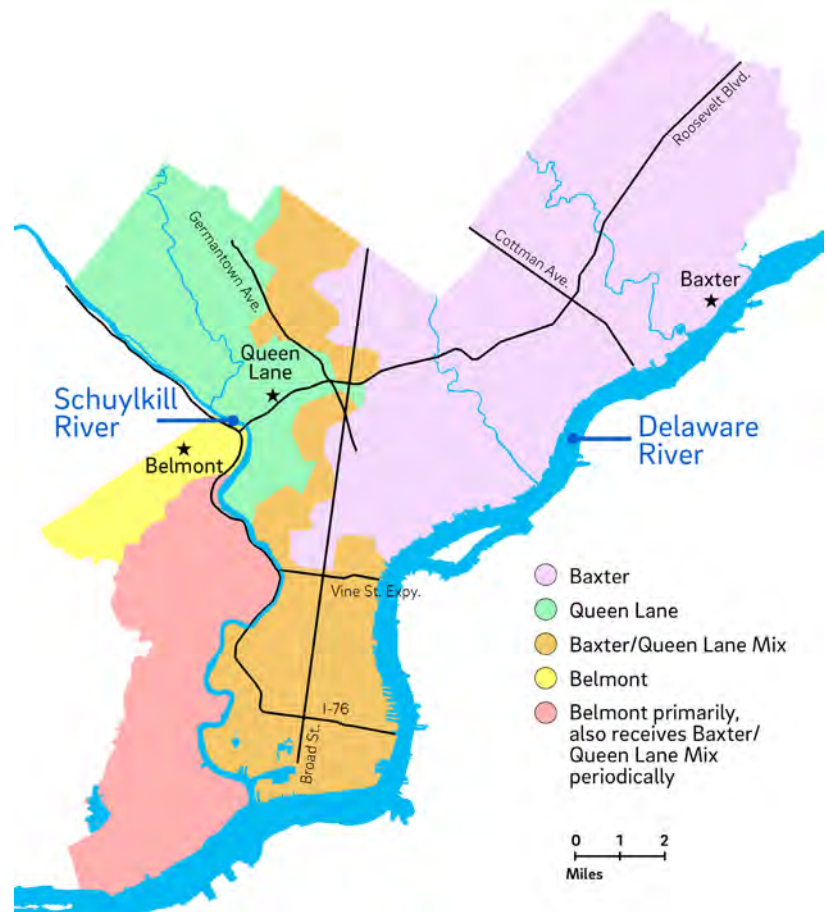
Where Does Philadelphia's Drinking Water Come From?

Philadelphia's water comes from the Schuylkill and Delaware rivers. Each river contributes one-half of the City's overall supply and approximately 250 million gallons of high-quality drinking water is produced for our customers on a daily basis.

Rivers are surface water supplies.
Philadelphia does not use groundwater.

The Philadelphia Water Department (PWD) has three water treatment plants that process untreated river water. Depending on where you live, you receive drinking water from one of these three plants.

The Queen Lane Plant is located in East Falls and its water comes from the Schuylkill River; its intake is located along Kelly Drive. The Belmont Plant is located in Wynnefield and its water also comes from the Schuylkill River; its intake is located along Martin Luther King Jr. Drive. The Baxter Plant is located in Torresdale and its water comes from the Delaware River; its intake is located at the plant on the Delaware River.



Philadelphia is located in the Delaware River Watershed, which begins in New York State and extends 330 miles south to the mouth of the Delaware Bay. The Schuylkill River is part of the Delaware River Watershed.

Safeguarding The Water You Drink

How Do Drinking Water Sources Become Polluted?

Across the nation, rivers, lakes, streams, ponds, reservoirs, springs and wells are sources of drinking water (both tap water and bottled water). Rain and melting snow travels over the surface of the land or through the ground, dissolving naturally occurring minerals and picking up substances resulting from animal and human activity and carrying these pollutants to our drinking water sources.

Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria, from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
- Inorganic contaminants, such as salts and metals can be naturally occurring or come from urban stormwater runoff (streets and parking lots), industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- Pesticides and herbicides from a variety of sources such as agriculture, urban stormwater runoff and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals, are byproducts of industrial processes and petroleum production. They can also come from gas stations, urban stormwater runoff and septic systems.
- Radioactive contaminants can be naturally occurring or can come from oil and gas production, mining activities or medical use.



Today, Philadelphia enjoys watersheds that are cleaner and healthier than they have been in well over a century.

At their sources, the Delaware and Schuylkill Rivers are generally clean. But as the rivers flow downstream, they pick up contaminants from many sources — stormwater runoff washes pollutants on the land into the rivers, and communities and industries discharge used water back into the rivers. Today, Philadelphia enjoys watersheds that are cleaner and healthier than they have been in well over a century. Although we have seen a dramatic improvement in the water quality of the City's two major rivers since the passage of the Federal Clean Water Act in the early 1970s, there is still more work that needs to be done to protect our drinking water sources from pollution.

In order to assure that tap water is safe to drink, EPA and DEP prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. FDA and DEP regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

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, 800.426.4791, or from their website: www.epa.gov/safewater.

Lead in Drinking Water

PA DEP Guidance

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from material and components associated with service lines and home plumbing. The Philadelphia Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. If you haven't turned on your tap for several hours, you can minimize the potential for lead exposure by flushing your tap before using water for drinking and cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline (800.426.4791) or at: www.epa.gov/safewater/lead.

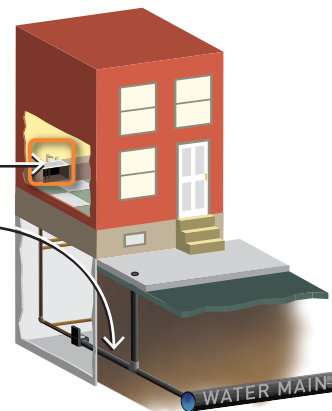
The drinking water delivered to your home meets all state and federal water quality standards.

Our water mains are not made of lead. However, some homes built before 1950 may have **service lines** made from lead.

While lead was once a common building material, today we know lead is harmful to everyone. Pregnant women, infants, children under the age of six and adults with high blood pressure and kidney problems are at the most risk.

Lead can also be found in older brass fixtures and valves and in old solder, where pipes are joined.

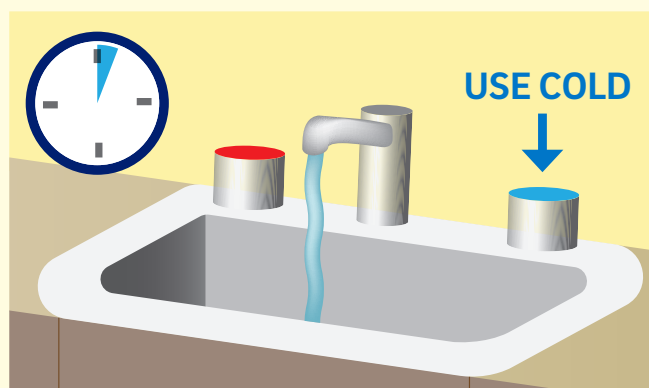
Service Line: *This pipe connects home plumbing to the water main in the street, and is the responsibility of the homeowner.*



Whether you have lead pipes or not, all households should follow the tips below.

Instructions for daily pipe flushing

If you have not used your water for a few hours, turn on the cold water faucet at the sink that you drink from, and let the water run for **three to five minutes**.



Why Flush? It's good to avoid drinking water that has been sitting in your home's pipes for several hours.

- Never drink hot water from the tap, or use that water for cooking. Water heaters aren't made for drinking water.
- Clean **aerators** (also called screens) to remove debris from any taps used for drinking water.

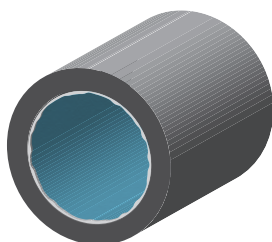
How We Manage Lead

We continuously monitor drinking water to make sure our treatment helps to keep lead out of water in buildings with lead plumbing. As a part of our testing efforts, we ask Philadelphia households with lead water pipes to participate in our free tap water sampling program.

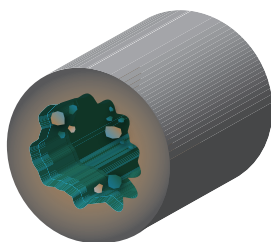
Every three years, PWD samples at least 50 homes with lead plumbing and tests the water for lead levels. These samples are a required part of the EPA's Lead and Copper Rule, which was created in 1992 to make sure that our corrosion control treatment is working.

Our corrosion control program, as mandated by federal law and optimized over the past two decades, minimizes the release of lead from service lines, pipes, fixtures, and solder by creating a coating designed to keep lead from leaching into the water.

To date, sampling results show that our treatment is controlling corrosion in our customers' plumbing.



With corrosion control



Without corrosion control

Lead Testing: July – December 2016

The Philadelphia Water Department conducted a lead testing program from July through December 2016 independent of its normal regulatory sampling requirements. PWD consulted with the EPA and PADEP on the design and timeline of the testing with the intent of going above and beyond existing sampling requirements.

In this round of lead testing, PWD obtained samples from 68 homes with lead service lines. One out of the 68 homes sampled had a result higher than the EPA action level of 15 ppb. Ninety percent (90%) of customer's homes tested was less than 3 ppb.

Regulatory Sampling was completed most recently in 2014 and results can be found on page 16. The next round of regulatory sampling will take place in 2017.



If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available on PWD's website at www.phila.gov/lead or from the Safe Drinking Water Hotline **1.800.426.4791**, or at: www.epa.gov/safewater/lead

Lead in Drinking Water *(continued)*

In 2016, PWD increased efforts to educate customers about lead in drinking water and also introduced new programs to help replace lead service lines:



Service line replacement during water main replacement work

When the Philadelphia Water Department replaces a water main, we will also replace any lead service line from the main all the way to the customer's meter. This will be done at no cost to the customer, but permission is needed to complete this valuable service.

All customers on blocks where water main replacement is scheduled will receive a letter approximately six months before construction work begins. In addition to alerting customers about construction, this letter lets them know their service line will be inspected for lead.

If you think water main work is being done on your street and you did not get any notification about service lines or flushing, please call our hotline at 215.685.6300.



Let's learn about lead: Community Organization Presentations

The Philadelphia Water Department offers a 30-minute presentation about our programs and lead safety for Registered Community Organizations and civic associations. Our goal is to empower customers to address any issues with lead plumbing in their homes.

Educational materials, such as fact sheets and instructions for maintaining home plumbing, can be translated into a variety of languages to meet the needs of community members.

To schedule a presentation, interested organizations can call us at 215.685.6300 or email: waterinfo@phila.gov.



Updated website

www.phila.gov/water/lead

Our website provides information about all Philadelphia Water Department efforts to assist and educate customers about lead in drinking water. *You will find:*

1. Options for getting water tested
2. How to check for lead pipes
3. Daily flushing tips to ensure fresh water
4. Tips on maintaining household plumbing
5. The most recent lead sampling results



HELP Loan for Lead Service Line Replacement

In the City of Philadelphia, water service lines are the responsibility of the homeowner. If you have a water service line made of lead and want to replace it, you may qualify for the Homeowner's Emergency Loan Program (HELP). HELP is a zero-interest loan for replacement of a lead service line, payable over a sixty-month (60) period.

HELP Loan Eligibility Guidelines:

- The property must be a residential dwelling and cannot have any more than four units.
- The applicant cannot be delinquent on their monthly water bill(s) for more than two (2) billing cycles. If there is an arrearage, the payment agreement with the Water Revenue Bureau must be current for at least six (6) months.
- The property must have an operable water meter.

Partnership For Safe Water

The Philadelphia Water Department (PWD) consistently produces high quality drinking water, achieving Partnership for Safe Water quality standards that are far stricter than state and federal water quality regulatory requirements. The Philadelphia Water Department voluntarily adopted the stricter water treatment quality goals as a member of the Partnership for Safe Water in 1996. The average turbidity level (measure of water clarity) of Philadelphia's drinking water has been at or below 0.06 nephelometric turbidity units (NTU) since 1998.

The average turbidity of Philadelphia's drinking water in 2016 is 82 percent lower than the maximum of 0.30 NTU allowed by state and federal regulations and is 47 percent less than the Partnership for Safe Water maximum turbidity goal of 0.10 NTU.

In 2013, the Baxter, Queen Lane and Belmont Water Treatment Plants were honored by EPA and PADEP with the Partnership for Safe Water 15-Year Director's Award in recognition of the Philadelphia Water Department's (decade) long commitment to achieving and maintaining the highest possible drinking water quality.

The Water Department extended its participation in the Partnership for Safe Water initiative by becoming a charter member in the new Distribution System Optimization Program in 2015. This self-assessment initiative extends our focus from the treatment process to ensuring delivery of high quality water by maintaining distribution system integrity.

The Partnership for Safe Water is a voluntary optimization program conceived and initiated by the EPA, the American Water Works Association, the Association of Metropolitan Water Agencies and advocated by the Pennsylvania Department of Environmental Protection. Pennsylvania leads the nation in participation in this program and the Philadelphia Water Department is one of Pennsylvania's leaders.



Why is chlorine used to disinfect the drinking water?

State and federal laws require the disinfection of all public water supplies. EPA and health agencies recognize that using chlorine is one of the most effective ways to protect public health from disease-causing organisms that can be found in rivers and streams. However, chlorine can chemically react with natural materials in rivers to form disinfection by products, such as trihalomethanes and haloacetic acids. We have been adjusting our treatment process over the years to reduce this chemical reaction, but we also ensure that the treated water that is distributed through the City's water mains to your homes has a "chlorine residual." This residual continues to protect your water against bacteria and other organisms on its journey to your home's tap. We use sodium hypochlorite, a safer form of chlorine similar to household bleach, to disinfect the water at our treatment plants.

Pharmaceuticals and Source Water

Pharmaceuticals get into drinking water because people use both prescription and over-the-counter medications. Only a portion of these substances is absorbed into the bloodstream. The rest is excreted by the body, making its way through wastewater treatment plants and back into the waterways that serve as our drinking water sources.

You can help keep unused pharmaceuticals out of the water supply by paying attention to how you dispose of unused medications. Look for take-back programs that may be established near you. The Drug Enforcement Agency (DEA) sponsors national take-back programs in coordination with State and local law enforcement agencies.

National take-back programs provide opportunities for the public to surrender expired, unwanted or unused pharmaceuticals and other medications to law enforcement officers for proper disposal. To find out about future take-back events, visit DEA's website at www.deadiversion.usdoj.gov/drug_disposal/takeback.

Properly Dispose Of Your Medications At Home!



Protect Your Info

Peel off the label, or cross out all your personal information with a marker.



Seal the Meds

Put the pills or liquids in another container, then cover with items like coffee grounds or kitty litter.



Trash It!

Toss sealed meds in your household trash.

To learn more about pharmaceuticals and drinking water, view the short instructional video developed by PWD and the Philadelphia chapter of Physicians for Social Responsibility: www.vimeo.com/78005190

Cryptosporidium and Giardia

***Cryptosporidium* and *Giardia* are microscopic organisms found in rivers and lakes throughout the United States.**

If ingested, *Cryptosporidium* and *Giardia* can cause diarrhea and abdominal cramps. However, these are also symptoms of intestinal diseases caused by many bacteria, viruses and parasites.

Most healthy individuals can overcome such illnesses within a few weeks; however, immuno-compromised individuals are at a greater risk of developing a life-threatening illness and are encouraged to consult with their doctors about taking appropriate precautions to avoid infections.

PWD carefully monitors water treatment processes and works closely with the Philadelphia Department of Public Health to ensure that our tap water is free of pathogens that can be found in rivers. The Department of Public

Health monitors local hospital records in real time for symptoms consistent with waterborne illnesses and would contact PWD if there were any concerns that the drinking water may be contributing to illnesses.

The Philadelphia Water Department is one of the nation's leaders in *Cryptosporidium* research and was one of the first utilities in the U.S. to monitor for the organism. The Philadelphia Water Department manages a source water protection program that looks at protecting the rivers in the City as well as farther upstream of Philadelphia. PWD continues source water *Cryptosporidium* research, in collaboration with Lehigh University. By identifying sources of *Cryptosporidium* in the watershed, PWD is taking a proactive approach in improving our rivers' water quality. Please refer to page 16 for results from 2016 *Cryptosporidium* monitoring.

Schuylkill and Delaware River Source Water Protection Plans

The Schuylkill and Delaware River Source Water Protection Plans provide a comprehensive framework for implementing a watershed-wide effort to improve source water quality and quantity. The plans prioritize and outline several approaches to reduce sources of contamination to Philadelphia's raw water supply. PWD has made exceptional progress accomplishing these goals. We've established the Schuylkill Action Network, a regional partnership in the Schuylkill River Watershed, and have prioritized land for permanent protection. PWD also advocates for policies to protect and preserve our source waters and forested lands and collaborates with the Commonwealth of Pennsylvania to ensure regulations are enforced for wastewater treatment plants and industries that discharge upstream of Philadelphia. Philadelphia's program is nationally recognized and, most recently, has been included as an exemplary case study of source water protection in published AWWA industry standards.



Progress has been made addressing potential threats to our water supply within Philadelphia's own boundaries. Educational campaigns promoting proper disposal of unused pharmaceuticals and outreach efforts to mark storm drains in the City that drain directly to surface waters demonstrate the relationship between river water quality and drinking water quality. Projects like improved stream buffers in Fairmount Park and goose deterrent programs at local schools and parks reduce the amount of water quality contaminants entering our local waterways.

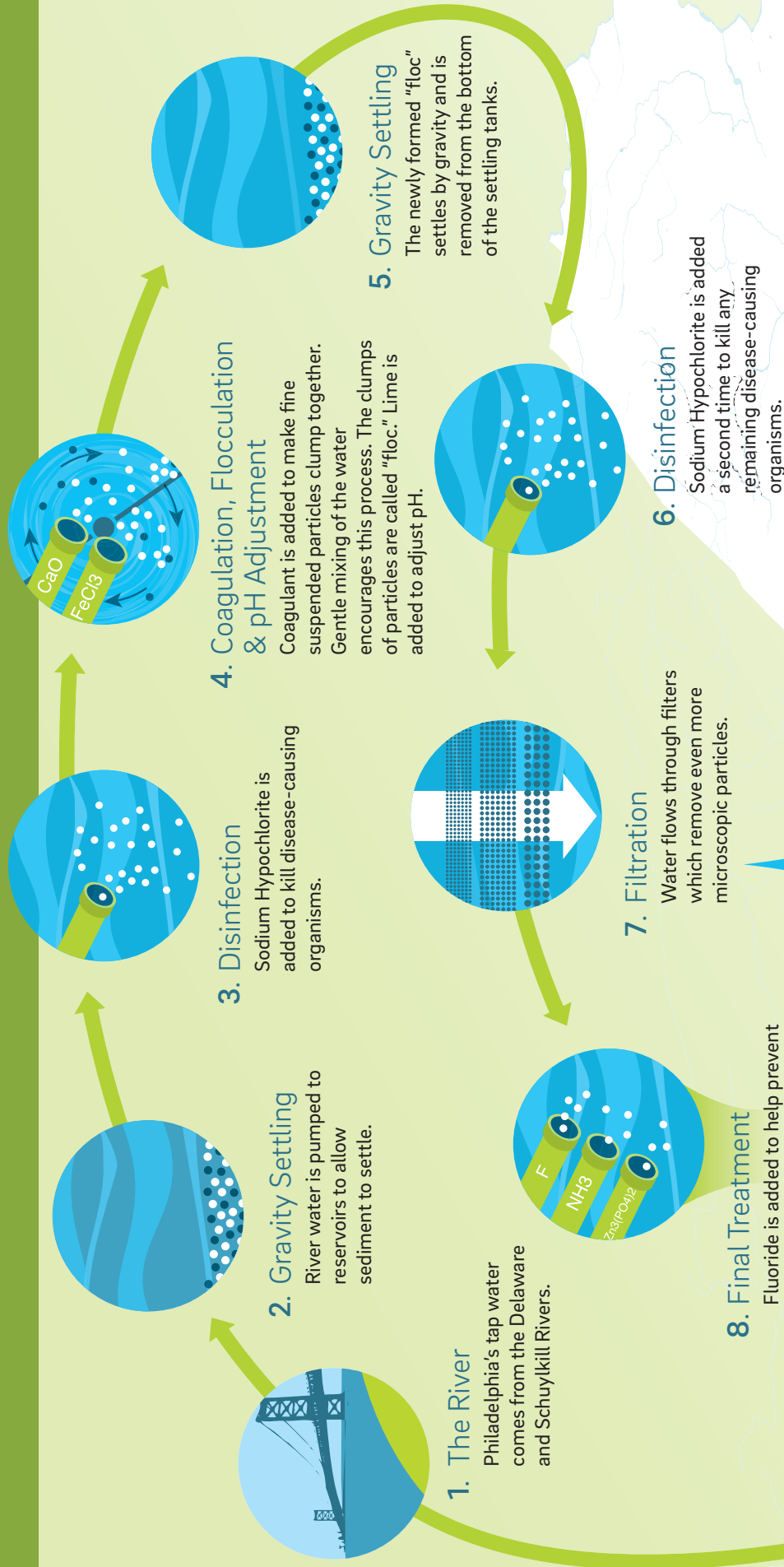
The Source Water Protection Program conducts research to improve the Philadelphia Water Department's knowledge of potential concerns to Philadelphia's water supplies. This research further defines our watershed protection priorities. Recent and on-going studies include analyzing flows needed to protect PWD's drinking water intakes on both the Schuylkill and the Delaware Rivers, evaluating upstream development policies and activities to ensure continued protection of our drinking water supply, tracking of major sources of human infectious pathogens such as *Cryptosporidium* and following water quality trends and climate change predictions.

In 2016, PWD completed its fourth year of implementation of a 5-year Watershed Control Plan to reduce *Cryptosporidium* in the Schuylkill River watershed. The Watershed Control Plan helps ensure PWD's compliance with the EPA's Long-Term 2 Enhanced Surface Water Treatment Rule at the Queen Lane Drinking Water Treatment Plant.

PWD has also made significant progress toward upgrading, expanding and improving upon the Delaware Valley Early Warning System (EWS), a mass communication network used to notify water suppliers and industrial users throughout the watershed of any spills or other water quality concerns via email and telephone. PWD continues to further enhance this system with advanced technological upgrades and improvements like a tidal spill modeling component that was a recipient of a 2015 Governor's Award for Environmental Excellence. In 2016, the EWS was featured in the EPA's online source water quality monitoring manual along with PWD's collaborative city-wide water resource monitoring program with the United States Geological Survey. PWD continues to work closely with the City's Office of Emergency Management and state and federal agencies to ensure that we are ready and able to respond to any water-related emergency event.

How Do We Make Water Drinkable?

Like the majority of water utilities in the U.S., we use a multi-step treatment process at all three of our drinking water treatment plants. This Water Treatment Process diagram provides a brief description of drinking water treatment in Philadelphia.



Schedule DM-4

546,000,000

Gallons of water Philadelphia can treat and distribute everyday

The average Philadelphian uses

67

START

How Do We Process Wastewater?

After water is used, PWD is responsible for cleaning it before returning the water to the river. This is the Wastewater Treatment Process.

87

gallons of water per day

Shower
20 Gal.

Washer
17 Gal.

Toilet
22 Gal.

Faucet
13 Gal.

Dishwasher
8 Gal.

Other
7 Gal.

1. Collection & Pumping

Wastewater flows from homes by gravity and is pumped up to the treatment plant from underground.

2. Screening

Debris and trash are removed from the wastewater.

3. Grit Removal

Small debris, like sand and gravel, is removed by gravity.

4. Gravity Settling

Suspended solids settle to the bottom by gravity and oil and grease rise to the top.

1,000,000,000

Gallons of wastewater/stormwater Philadelphia can process a day

5. Aeration & Biological Reduction

Air and waste-eating microbes remove remaining contaminants.

6. Gravity Settling

Living microbes settle by gravity to be recycled to the Aeration Tanks. Excess microbes are sent to the digesters.

FINISH

8. Effluent Discharge

The treated water is returned to the river.

7. Disinfection

Sodium Hypochlorite is added to kill any remaining disease-causing organisms.

Air

Grit to Landfill

digesters

Settled solids travel through digesters which produce natural gas and biosolids that are recycled as fertilizer.

O₂

Cl

Monitoring Water Quality: What Do We Look For?

Public Drinking Water Systems monitor their treated drinking water for approximately 100 regulated contaminants. These regulatory parameters are defined within Federal rules such as the Total Coliform Rule, Surface Water Treatment Rule, Disinfectants and Disinfection Byproducts Rules, Lead and Copper Rule and the Radionuclides Rule. We monitor for the regulated parameters listed below. Tables on the following pages summarize monitoring results for parameters found at detectable levels. Please refer to the glossary of terms and abbreviations for more information.

Inorganic Chemicals:

Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cyanide, Fluoride, Mercury, Nickel, Nitrite, Selenium, Thallium

Synthetic Organic Chemicals:

2,3,7,8 - TCDD (Dioxin), 2,4 - D, 2,4,5 - TP (Silvex), Alachlor, Atrazine, Benzopyrene, Carbofuran, Chlordane, Dalapon, Di(ethylhexyl)adipate, Di(ethylhexyl)phthalate, Dibromochloropropane, Dinoseb, Diquat, Endothall, Endrin, Ethylene Dibromide, Glyphosate, Heptachlor, Heptachlor Epoxide, Hexachlorobenzene, Hexachlorocyclopentadiene, Lindane, Methoxychlor, Oxamyl, PCBs, Pentachlorophenol, Picloram, Simazine, Toxaphene

Volatile Organic Chemicals:

Benzene, Carbon Tetrachloride, 1,2-Dichloroethane, o-Dichlorobenzene, p-Dichlorobenzene, 1,1-Dichloroethylene, cis-1,2-Dichloroethylene, trans-1,2-Dichloroethylene, Dichloromethane, 1,2-Dichloropropane, Ethylbenzene, Monochlorobenzene, Styrene, Tetrachloroethylene, Toluene, 1,2,4-Trichlorobenzene, 1,1,1-Trichloroethane, 1,1,2-Trichloroethane, Trichloroethylene, o-Xylene, m,p-Xylenes

Appealing to Your Senses

We also test for aluminum, chloride, color, iron, manganese, odor, pH, silver, sulfate, surfactants, total dissolved solids and zinc to ensure that your water meets all water quality aesthetic guidelines. This is so that your water looks, tastes and smells the way it should.

Temperature and Cloudiness

The temperature of the Schuylkill and Delaware rivers varies seasonally from approximately 34 degrees to 91 degrees Fahrenheit. The Philadelphia Water Department does not treat the water for temperature. Cloudiness in tap water most commonly happens in the winter, when the cold water from the water main is warmed up quickly in household plumbing. Cold water and water under pressure can hold more air than warmer water and water open to the atmosphere. When really cold winter water comes out of your tap, it's simultaneously warming up and being relieved of the pressure it was under inside the water main and your plumbing. The milky white color is actually just tiny air bubbles. If you allow the glass to sit undisturbed for a few minutes, you will see it clear up gradually from the bottom up.

Parameters listed below are not part of EPA's requirements and are provided for information purposes.

SODIUM IN TAP WATER			
	Baxter WTP One Year Average	Belmont WTP One Year Average	Queen Lane WTP One Year Average
Average (ppm)	24 ppm	47 ppm	45 ppm
Average (mg in 8 oz. glass of water)	6 mg	11 mg	11 mg
Range (ppm)	17 – 39 ppm	28 – 76 ppm	30 – 60 ppm
Range (mg in 8 oz. glass of water)	4 – 9 mg	7 – 18 mg	7 – 14 mg

HARDNESS IN TAP WATER			
	Baxter WTP One Year Average	Belmont WTP One Year Average	Queen Lane WTP One Year Average
Average	92 ppm or 5 gpg	151 ppm or 9 gpg	166 ppm or 10 gpg
Minimum	82 ppm or 5 gpg	110 ppm or 6 gpg	133 ppm or 8 gpg
Maximum	100 ppm or 6 gpg	196 ppm or 11 gpg	217 ppm or 13 gpg

Hardness defines the quantity of minerals, such as calcium and magnesium, in water. These minerals react with soap to form insoluble precipitates and can affect common household chores such as cooking and washing. Philadelphia's water is considered "medium" hard.

ALKALINITY IN TAP WATER			
	Baxter WTP One Year Average	Belmont WTP One Year Average	Queen Lane WTP One Year Average
Average	40 ppm	72 ppm	70 ppm
Minimum	27 ppm	45 ppm	46 ppm
Maximum	57 ppm	102 ppm	94 ppm

Glossary

Some of the words we use in the following charts may not be familiar to you. Here are definitions of technical and other terms.

Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow. The action level is not based on one sample; instead, it is based on many samples.

Alkalinity: A measure of the water's ability to resist changes in the pH level and a good indicator of overall water quality. Although there is no health risk from alkalinity, we monitor it to check our treatment processes.

E. coli (Escherichia coli): A type of coliform bacteria that is associated with human and animal fecal waste.

gpg (grains per gallon): A unit of water hardness. One grain per gallon is equal to 17.1 parts per million.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

mg/L (Milligrams per liter): One milligram per liter is equal to one part per million.

MRDL (Maximum Residual Disinfection Level): The highest level of disinfectant that is allowed in drinking water. The addition of a disinfectant is necessary for the control of microbial contaminants.

MRDLG (Maximum Residual Disinfection Level Goal): The level of a disinfectant in drinking water below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Minimum Residual Disinfectant

Level: The minimum level of residual disinfectant required at the entry point to the distribution system.

NTU (nephelometric turbidity units): Turbidity is measured with an instrument called a nephelometer. Measurements are given in nephelometric turbidity units.

Pathogens: Bacteria, virus, or other microorganisms that can cause disease.

pCi/L (Picocuries per liter): A measure of radioactivity.

ppm (parts per million): Denotes 1 part per 1,000,000 parts, which is equivalent to two thirds of a gallon in an Olympic-sized swimming pool.

ppb (parts per billion): Denotes 1 part per 1,000,000,000 parts, which is equivalent to half a teaspoon in an Olympic-sized swimming pool.

µg/L (Microgram per liter): One microgram per liter is equal to one part per billion.

ppt (parts per trillion): Denotes 1 part per 1,000,000,000,000 parts, which is equivalent to one drop in 20 Olympic-sized swimming pools.

SOC (Synthetic Organic Chemical): Commercially made organic compounds, such as pesticides and herbicides.

Total Coliform: Coliforms are bacteria that are naturally present in the environment. Their presence in drinking water may indicate that other potentially harmful bacteria are also present.

THAAs (Total Haloacetic Acids): A group of chemicals known as disinfection byproducts. These form when a disinfectant reacts with naturally occurring organic and inorganic matter in the water.

TOC (Total Organic Carbon): A measure of the carbon content of organic matter. This measure is used to indicate the amount of organic material in the water that could potentially react with a disinfectant to form disinfection byproducts.

TTHMs (Total Trihalomethanes): A group of chemicals known as disinfection byproducts. These form when a disinfectant reacts with naturally occurring organic and inorganic matter in the water.

Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.

Turbidity: A measure of the clarity of water related to its particle content. Turbidity serves as an indicator for the effectiveness of the water treatment process. Low turbidity measurements, such as ours, show the significant removal of particles that are much smaller than can be seen by the naked eye.

VOC (Volatile Organic Chemicals): Organic chemicals that can be either man-made or naturally occurring. These include gases and volatile liquids.

WTP: Water Treatment Plant

2016 Drinking Water Quality Results

Listed on pages 16 – 18 are our Drinking Water Quality Results for 2016. All results are better than the recommended federal levels designed to protect public health. By reporting these results in the tables below, we are meeting a requirement of the EPA. Please see the glossary on page 15 for definitions of abbreviations used in the tables. Some contaminants may pose a health risk at certain levels to people with special health concerns. Others are used as indicators for treatment plant performance. For more information, please visit our website at www.phila.gov/water or call us at 215.685.6300.

LEAD AND COPPER - Tested at Customers' Taps. Testing is performed every 3 years. Results shown are from 2014.

	EPA's Action Level - for a representative sampling of customer homes	Ideal Goal (EPA's MCLG)	90% of PWD customers' homes were less than	Number of homes considered to have elevated levels	Violation	Source
Lead	90% of homes must test less than 15 ppb	0 ppb	5.0 ppb	7 out of 134	No	Corrosion of household plumbing; Erosion of natural deposits
Copper	90% of homes must test less than 1.3 ppm	1.3 ppm	0.31 ppm	0 out of 134	No	Corrosion of household plumbing; Erosion of natural deposits; Leaching from wood preservatives

CRYPTOSPORIDIUM - Tested at Source Water to Water Treatment Plants Prior to Treatment.

Treatment Technique Requirement	Baxter WTP One Year Range	Belmont WTP One Year Range	Queen Lane WTP One Year Range	Source
Total Number of Samples Collected	24	24	24	Naturally present in the environment
Number of <i>Cryptosporidium</i> Detected	22	22	17	
	0.092 count/L	0.092 count/L	0.071 count/L	

Cryptosporidium is a microbial pathogen found in surface water throughout the U.S. Although filtration removes *Cryptosporidium*, the most commonly-used filtration methods cannot guarantee 100 percent removal. Our monitoring indicates the presence of these organisms in our source water. Current test methods do not allow us to determine if the organisms are dead or if they are capable of causing disease. The levels found in the rivers help to dictate the degree of control we must use.

BACTERIA IN TAP WATER - Tested throughout the Distribution System. Over 440 samples collected throughout the City every month.

	Highest Level Allowed (EPA's MCL)	Ideal Goal (EPA's MCLG)	Highest Monthly % or Yearly Total of Positive Samples	Monthly Range (% or #)	Violation	Source
Total Coliform	5% of monthly samples are positive*	0	0.19%	0 – 0.19%	No	Naturally present in the environment
<i>E. coli</i>	0*	0	0	0	No	Human or animal fecal waste

*Every sample that is positive for total coliforms must also be analyzed for *E. coli*. If a system has two consecutive total coliform positive samples, and one is also positive for *E. coli* then the system has an MCL violation. There were no Level 1 and Level 2 assessments required under Revised Total Coliform Rule in 2016.

2016 Drinking Water Quality Results

INORGANIC CHEMICALS (IOC) - PWD monitors for IOC more often than required by EPA.						
Chemical	Highest Level Allowed (EPA's MCL)	Ideal Goal (EPA's MCLG)	Highest Result	Range of Test Results for the Year	Violation	Source
Antimony	6 ppb	6 ppb	0.3 ppb	0 – 0.3 ppb	No	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Barium	2 ppm	2 ppm	0.047 ppm	0.028 – 0.047 ppm	No	Discharges of drilling wastes; Discharge from metals refineries; Erosion of natural deposits
Chromium	100 ppb	100 ppb	1 ppb	0 – 1 ppb	No	Discharge from steel and pulp mills; Erosion of natural deposits
Fluoride	2 ppm*	2 ppm*	0.75 ppm	0.71 – 0.75 ppm	No	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories
Nitrate	10 ppm	10 ppm	4.62 ppm	0.94 – 4.62 ppm	No	Runoff from fertilizer use; Leaching from septic tanks; Erosion of natural deposits
*EPA's MCL and MCLG is 4 ppm, but PADEP has set this lower MCL and MCLG which takes precedence.						

TOTAL CHLORINE RESIDUAL - Continuously Monitored at Water Treatment Plants.					
Sample Location	Minimum Disinfectant Residual Level Allowed	Lowest Level Detected	Yearly Range	Violation	Source
Baxter WTP	0.2 ppm	2.14 ppm	2.14 – 3.34 ppm	No	Water additive used to control microbes
Belmont WTP		1.12 ppm	1.12 – 2.76 ppm	No	
Queen Lane WTP		1.57 ppm	1.57 – 3.71 ppm	No	

TOTAL CHLORINE RESIDUAL - Tested throughout the Distribution System. Over 450 samples collected throughout the City every month.					
Sample Location	Maximum Disinfectant Residual Level Allowed	Highest Monthly Average	Monthly Average Range	Violation	Source
Distribution System	4.0 ppm	2.15 ppm	1.45 – 2.15 ppm	No	Water additive used to control microbes

2016 Drinking Water Quality Results

TOTAL ORGANIC CARBON - Tested at Water Treatment Plants.

Treatment Technique Requirement	Baxter WTP One Year Range	Belmont WTP One Year Range	Queen Lane WTP One Year Range	Violation	Source
Percent of Removal Required	35%	25 – 35%	25 – 35%	n/a	Naturally present in the environment
Percent of Removal Achieved	10 – 66%	29 – 72%	30 – 63%	No	
Number of Quarters out of Compliance	0	0	0	No	
PWD achieved TOC removal requirements in all quarters of 2016 at all WTPs. Compliance is based on a running annual average computed quarterly.					

TURBIDITY - A Measure of Clarity Tested at Water Treatment Plants.

	Baxter WTP	Belmont WTP	Queen Lane WTP	Violation	Source
Treatment Technique Requirement: 95% of samples must be at or below 0.300 NTU	100% below 0.300 NTU	100% below 0.300 NTU	100% below 0.300 NTU	n/a	Soil runoff, river sediment
Highest single value for the year	0.081 NTU	0.090 NTU	0.100 NTU	No	

We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not your drinking water meets health standards. PWD continuously operates and monitors water quality from a total of 160 filters at three drinking water treatment plants. In calendar year 2016, on two separate occasions, turbidity monitoring was interrupted on one of our filters and therefore we cannot be sure of the quality of the drinking water from this filter during that time. On October 21, 2016 for a 31 hour period the turbidity instrument on filter 27 at Queen Lane WTP was not recording data signals. On November 4, 2016, filter 14 at Queen Lane WTP was left in the hold position following a routine calibration check for an almost 16 hour period without the monitoring instrument activated. After each monitoring interruption, once the turbidimeter instruments were restored, subsequent monitoring showed no filter problems. During each single filter monitoring interruption, the combination flow from the plant filters at each facility was continuously sampled and monitored with no change in turbidity levels. No water quality emergency occurred due to the monitoring interruptions, and this notice is for informational purposes only.

DISINFECTION BY-PRODUCTS

	Highest Level Allowed (EPA's MCL) - One Year Average	Running Annual Average 2016*	System Wide Range of Individual Results	Violation	Source
Total Trihalomethanes (TTHMs)	80 ppb	53 ppb	14 – 98 ppb	No	By-product of drinking water disinfection
Total Haloacetic Acids (THAAs)	60 ppb	44 ppb	15 – 89 ppb	No	By-product of drinking water disinfection

*Monitoring is conducted at 16 locations throughout the City of Philadelphia. This result is the highest locational running annual average in 2016.

Free rain barrels? Rain Check is that... and so much more

Each year, *Green City, Clean Waters* projects soak up millions of gallons of polluted stormwater runoff from parks, schools, streets and other public places. But with more than 1.5 million people and hundreds of thousands of homes in Philadelphia, residents like you can play a big role in keeping local waterways clean.



That's why we started Rain Check*—the program most people associate with free rain barrels.

Launched in 2012, this program does indeed provide free rain barrels to Philly residents, with over 2,300 of the 55-gallon stormwater cisterns installed so far.

Perhaps lesser known? Rain Check also helps Philadelphia residents pay for beautiful landscaping that is specially designed to capture the water that falls on their properties during storms.

Are you interested in replacing an empty front yard with a garden? Need to fix a cracked rear patio? Trying to save water to use on your parched potted plants? Rain Check provided funding for these projects and more.

Native flowers in rain gardens or downspout planters, new permeable paver patios and rain barrels can all spruce up a property. But beyond looking good, each plays an important role in capturing stormwater that would otherwise contribute to sewer overflows that harm Philly's rivers.

Because of these water quality benefits, every Philadelphia resident can have a rain barrel installed at no cost, making them a favorite for those on a budget or with limited space. A step above the barrels (but still a steal at just \$100), our downspout planters also work well in tight areas and involve special container gardens connecting to gutter downspouts.

Other popular Rain Check projects include replacing hard surfaces like concrete patios with rain-absorbing permeable pavers or—one of our favorites—building flower-filled rain gardens.

On these large projects, **we contribute up to \$2,000** and set you up with Rain Check-certified, professional contractors who know how to get the most out of your space.

Spotlight on Rain Gardens



We're happy to install any stormwater tool, but rain gardens truly make us weak in the knees. A rain garden is exactly what it sounds like—a garden designed to capture water when it rains.

And we love them for a few reasons.

For one, these gardens can capture lots of stormwater, while a rain barrel or downspout planter can only catch some of what falls. And, for all the stormwater they keep out of our sewers, they don't cost as much as other projects. Since we can cover a large part of the cost with Rain Check, that makes them a good deal for us and for property owners.

On top of protecting local rivers and creeks, these little pockets of native perennial plants can sculpt bland, flat spaces to provide beauty throughout the year while creating habitat for birds and important pollinator species like butterflies and bees.

***Interested?** Just attend one of our hour-long educational Rain Check workshops. Sign up at www.phillywatersheds.org/raincheck

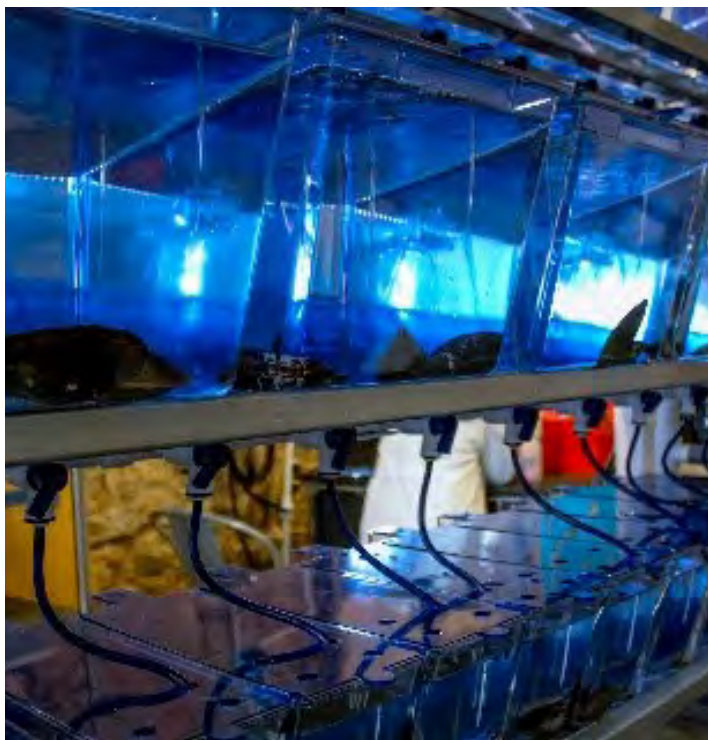
Rain Check is implemented by PWD through a partnership with the Pennsylvania Horticultural Society and the Sustainable Business Network, both not-for-profit organizations.

Fairmount Water Works: Innovation and Education Continues...

In 2016, the Fairmount Water Works' (FWW) program and partner list has continued to grow, along with FWW's ability to transform children and adults into environmental ambassadors. The Fairmount Water Works provides family-friendly activities, on- and off-site guided public tours, and hands-on, minds-in, experiential lessons for pre-K through college-age students.

With the support of various partners, FWW has successfully implemented initiatives with public engagement, including but not limited to: Art in the Open, Seeing is Believing, The Freshwater Mussel Hatchery, and Art on the Circuit.

The Fairmount Water Works also continued to rebrand itself as a premier venue for small-scale private events such as lectures and cocktail receptions, raising needed revenue in support of specialized educational programs.



Every freshwater mussel is like a mini-water treatment facility, filtering pollutants from about 20 gallons of water per day, resulting in cleaner river water!

Freshwater Mussel Hatchery

This project was made possible by generous support from the Pew Center for Arts & Heritage and PWD, with additional support from The McClean Contributionship, and in collaboration with the Partnership for the Delaware Estuary and The Academy of Natural Science of Drexel University. FWW was able to secure additional funding and support from the Pennsylvania Department of Conservation and Natural Resources for this 530-square-foot "living enclave." The Hatchery provides an opportunity for students in Philadelphia, and visitors to the Circuit, to participate and engage in a living laboratory, and develop an appreciation for, and connection to the river. The exhibit provides a critical public platform for education, interpretation, art, science and community outreach to build awareness and support for this sustainable approach to the health of our region's watersheds.

On February 16, 2017, partners, board members, and individuals instrumental in project development, visited the Water Works for a private preview of the Hatchery. FWW saw record numbers opening weekend, with more than 600 visitors coming to view the exhibition and aquatic field station. Come see the Hatchery for yourself during our normal operating hours, or visit www.mightymussel.com for more information.

Visit Us: People of all ages are invited to join us in discovering the wonders of water in our world.

Visit www.fairmountwaterworks.org or call 215.685.0723 for the latest program listings, tours, and events.

We also invite you to connect with us on Facebook, Twitter, and Instagram (@FairmountWW).

Canoemobile 2016

The Fairmount Water Works education staff participated in Wilderness Inquiry's Canoemobile, a roving fleet of passenger Voyageur canoes with the mission of getting as many youth as possible paddling on their local urban waterways. On Tuesday, October 18, more than 200 students and staff from local elementary, middle and high schools participated in educational activities designed to increase their capacity as good watershed stewards, and provide an opportunity to experience, enjoy, and learn about the Delaware River and its tributaries. Students also signed a simple but powerful pledge: "We Share Our Waterways, We Pledge to Care for Our Waterways."

Project FLOW (For the Love of Water)

This four-week, daily intensive summer program allows rising eighth- and ninth-grade students to explore water in an experiential and interdisciplinary way as artists, historians, scientists and social activists. Project FLOW provides an understanding of how individual and collective actions on the land affect the quality of water for all living things. Creating a clear path for young people and a call to action for civic responsibility and engagement is one of the chief objectives of the educational programming at the Fairmount Water Works and a major goal of Project FLOW. This past year, 13 participants (five boys and eight girls) came from schools throughout Philadelphia.

Schuylkill Acts & Impacts

Schuylkill Acts & Impacts (SA and I) was a weeklong expedition from June 18–25 for a select group of 12 high school students from the 5 counties (Schuylkill, Berks, Montgomery, Chester, and Philadelphia) in the Schuylkill River watershed. Applicants were required to complete a short answer application and individual phone interviews. Students spent the week learning about different water quality impacts in the watershed such as abandoned mine drainage, agricultural runoff, and stormwater runoff. The students participated in hands-on chemical and biological testing of the water facilitated by environmental scientists from Stroud Water Research Center, engaged with environmental professionals throughout the watershed, and camped and kayaked. Take it Outdoors Adventures is the outfitter. SA and I is a partnership program with the Schuylkill Headwaters Association and supported in part by generous donations from area Watershed organizations, parents and in-kind donations from Wawa and Brown's Family ShopRite.



Middle-years Teacher Fellowship Program

Launched in 2014, a \$500,000 grant from the William Penn Foundation enabled the Fairmount Water Works to create a three-year program to develop a new watershed curriculum. This cross-disciplinary, hands-on curriculum aligns urban watershed education with core NGSS Science and Common Core standards for Philadelphia school students in grades 6–8 and is available online at www.resourcewater.org.

Fairmount Water Works led a four-day professional development training workshop in August 2016 supported in part by a grant from the Department of Environmental Protection. The goal of the workshop was to give teachers the tools and the knowledge to pilot the middle years curriculum, Understanding the Urban Watershed, with students. Participants had a chance to explore the first two thematic units from Understanding the Urban Watershed (Water in Our World and Drinking Water and You). Material kits were subsequently provided to support classroom teaching. During the professional development session, teachers were offered rich content background on urban waterways and drinking systems. Two field trips complemented the units – one in the creek led by the Wissahickon Environmental Education Center educators and a guided tour of the drinking water process at Belmont Treatment Plant. The following schools were represented: Masterman Middle School, Richard Allen Charter School, Dobson School, Fitler School, Finletter School, and Bregy Elementary. Teachers received additional support throughout the year as needed, and field trips to Fairmount Water Works as requested.

Clean Water Begins and Ends With You

Don't Pollute!

Always recycle or dispose of household hazardous wastes properly. Don't pour motor oil, antifreeze or other toxic materials down storm drains, which connect to the city's sewer system.

Water that enters our storm drains often flows directly to our local streams and rivers. Recycle these household hazardous materials safely and help protect our waterways. Don't flush paint thinners, insect sprays, herbicides and other harmful chemicals down the toilet or put them down the sink. Contact the Streets Department to get a schedule of their Household Hazardous Materials Drop-off Events where you can dispose of these materials safely without polluting your drinking water supply.

We welcome your ideas and opinions

We participate in nearly 200 public and community events a year, including presentations made at schools, on-going educational programs and other environmental celebrations. We offer ways for individuals, families, students, seniors, community groups and others to participate in learning about protecting water.

Get Involved

If you would like to help protect your water supply or watershed, please call the Philadelphia Water Department at 215.685.6300, visit our website at www.phila.gov/water, or see Table 2 on page 23.

Contact us

Philadelphia Water Department
Aramark Tower
1101 Market Street, 3rd Floor
Philadelphia, PA 19107-2994

Customer Information Hotline:

215.685.6300

Important Telephone Numbers & Websites

Delaware River and Schuylkill River Source Water Assessments

www.phillywatersheds.org/what_were_doing/documents_and_data/watershed_plans_reports

Fairmount Water Works

215.685.0723

www.fairmountwaterworks.org

Philadelphia Streets Department

215.686.5560

www.philadelphiastreet.com

Philadelphia Water Department

215.685.6300

www.phila.gov/water

RiverCast

www.phillyrivercast.org

Schuylkill Action Network

800.445.4935

www.schuylkillwaters.org

U.S. Environmental Protection Agency Safe Drinking Water Hotline

800.426.4791

www.epa.gov/water

Water Revenue Bureau

215.686.6880

www.phila.gov/revenue

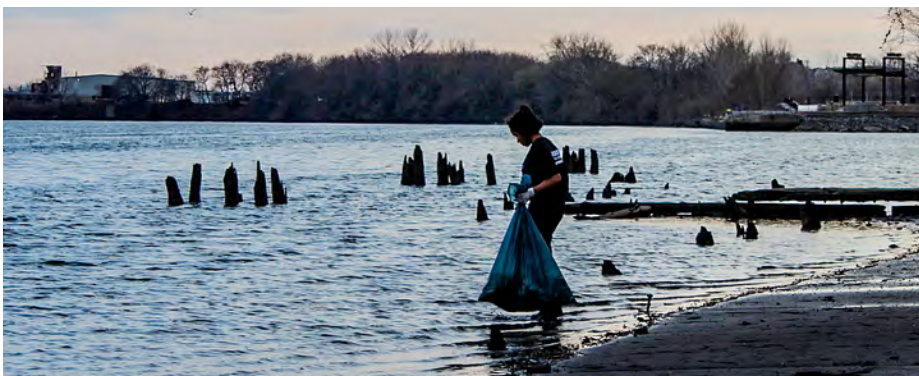


Table 1: Who To Call To Report Various Situations

Situation	Who to Call	Phone
Dead Fish	Fish & Boat Commission PADEP	717.626.0228 484.250.5900
Illegal Dumping & Related Pollution Activities	PADEP PWD	484.250.5900 215.685.6300
Sewage Spills	PADEP PWD	484.250.5900 215.685.6300
Oil & Gas Spills/Accidents	PADEP PWD	484.250.5900 215.685.6300

Table 2: Places To Go To Get Involved In Protecting Your Local Streams, Rivers And Water Supply

Organization	Activity Type	Phone	Website
Environmental Alliance for Senior Involvement	A, C, E, P, T	203.779.0024	www.easi.org
Friends of Fox Chase Farms	A, C, E, P	215.728.7900	www.foxchasefarm.org
Friends of the Manayunk Canal	A, C, E, P, T	N/A	www.manayunkcanal.org
Friends of Pennypack Park	A, C, E, P, T	215.934.PARK (7875)	www.friendsofpennypackpark.org
Friends of the Wissahickon	A, C, E, P, T	215.247.0417	www.fow.org
Lower Merion Conservancy	A, C, E, P, T	610.645.9030	www.lmconservancy.org
Partnership for the Delaware Estuary	A, B, C, E, P, S, T	800.445.4935	www.delawareestuary.org
Philadelphia Anglers Club	A, C, E, F	N/A	www.philadelphiaanglersclub.com
Philadelphia Canoe Club	F, R	215.487.9674	www.philacanoe.org
Schuylkill Action Network	A, B, C, E, L, P, T	800.445.4935x109	www.schuylkillwaters.org
Schuylkill Banks	B, E, L	N/A	www.schuylkillbanks.org
Schuylkill Center for Environmental Education	A, B, C, E, P, T	215.482.7300	www.schuylkillcenter.org
Senior Environment Corps	A, C, E, P, T	215.848.7722	www.centerinthepark.org
Tookany/Tacony-Frankford (TTF) Watershed Partnership	A, C, E, P, T	215.744.1853	www.ttfwatershed.org
U.S. Water Alliance	A, B, E	202.789.7751	www.uswateralliance.org
Wissahickon Restoration Volunteers	A, C, E, P, T	215.798.0044	www.wissahickonrestorationvolunteers.org
Wissahickon Valley Watershed Association	A, C, E, P, T	215.646.8866	www.wvwa.org

Activity Types**A:** Environmental activism**B:** Business-related protection and educational activities**C:** Clean-up of trash and litter**E:** Environmental education**F:** Fishing or fish recreation activities**L:** Land conservation and management**P:** Planting trees and streambank repair/protection**R:** Rowing, canoeing and related boating activities**S:** Storm drain marking**T:** Water quality testing



PHILADELPHIA
WATER
— DEPARTMENT —

Philadelphia Water Department

1101 Market Street

Philadelphia, PA 19107

215.685.6300

www.phila.gov/water

**Schedule DM-5: Delaware
Valley Early Warning System**

THE DELAWARE VALLEY EARLY WARNING SYSTEM

AN INTEGRATED MONITORING, NOTIFICATION AND COMMUNICATION SYSTEM

PROVIDING ADVANCED WARNING OF SURFACE WATER CONTAMINATION EVENTS IN THE LOWER DELAWARE AND SCHUYLKILL WATERSHEDS

The Philadelphia Water Department (PWD) received federal and state funding for the development of the Delaware Valley Early Warning System (EWS) in 2002. After two years of development and rigorous testing, the EWS was deployed as a fully functional system, providing valuable services to subscribing public and private water suppliers, surface water dependent industries, and government agencies throughout the lower Delaware and Schuylkill Watersheds. The successful application and development of the EWS is largely dependent on this *Partnership* of stakeholders. In addition to comprising the EWS steering committee, the EWS Partnership provides important information regarding the occurrence and status of contamination events in the coverage area.

Technological components of the system such as a sophisticated notification system, secure database portal, user-friendly website, and comprehensive water quality and flow monitoring network create the advanced functionality and unique capabilities that make the EWS an international model for surface water notification and monitoring systems.

The EWS *notification system* was developed to support existing downstream notification protocols. The notification process is initiated when an emergency responder reports the water quality event via the EWS hotline or website. An event report will then trigger email notifications to the entire user base and supplemental telephone notifications for high risk events in a matter of minutes.

Both the EWS *database portal and website* are fully integrated with the notification system and monitoring network. Event reports and additional event information, including estimated contaminant arrival times to each system intake and advanced mapping of contaminant transport, can be obtained through the website immediately following the initial report. A comprehensive history of all reported events is stored in the website's database for future reference. Water quality and flow data from the EWS *monitoring network*, consisting of approximately 90 on-line monitoring stations at USGS sites and drinking water treatment plant intakes throughout the coverage area, can be viewed and downloaded through the website's *Real-Time and Historic Data Query* functions. The website also features a *Spill Model Analysis Tool* that generates an event simulation to aid planning and response decisions.

The PWD supports ongoing system upgrades and enhancements to ensure that the EWS serves as the most advanced and robust system possible, helping to protect the drinking water supplies for over 3 million people.

For more information please contact the Source Water Protection Program at the Philadelphia Water Department:

▶▶▶ *Kelly Anderson, Program Manager*
kelly.anderson@phila.gov or 215.685.6245

▶▶▶ *Alison Aminto, Project Engineer*
alison.aminto@phila.gov or 215.685.6324

Schedule DM-6: Customer Information



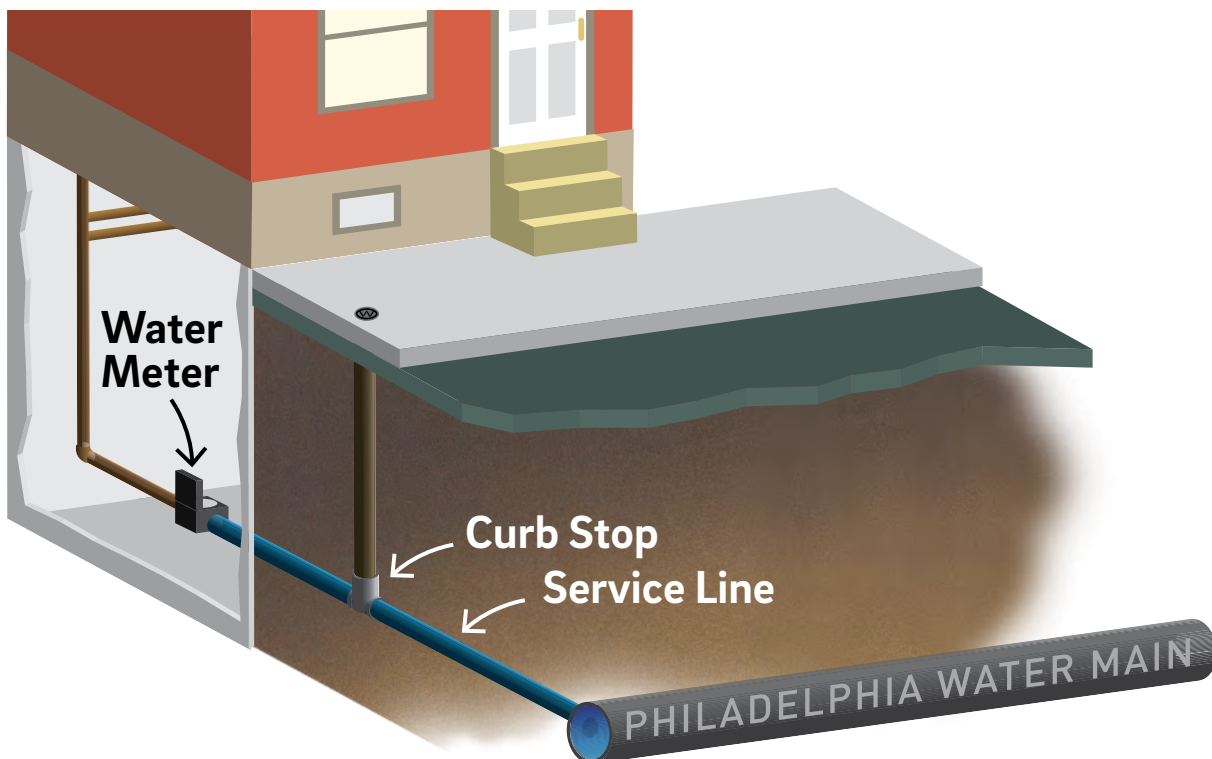
Using HELP loans to replace Lead Service Lines

Philadelphia Water administers a zero interest loan for the replacement of Lead Service Lines.

In the City of Philadelphia, water service lines and sewer drainage pipes are the responsibility of the homeowner. If you have a water service line made of lead, you may qualify for the **Homeowner's Emergency Loan Program (HELP)**. The money loaned for replacement of a lead service line will be at a zero (0) interest rate and payable over a sixty (60) month period.

Eligibility Guidelines:

- The property must be a residential dwelling and cannot have any more than four units.
- The property's water bill must be current. Money owed cannot exceed two (2) billing cycles. If there is an arrearage, the payment agreement with the Water Revenue Bureau must be current for at least six (6) months.
- The property must have an operable AMR water meter.



6/30/16



Call **215-685-4901** to be considered for a HELP Loan.

Applications will **only** be completed over the telephone.

IMPORTANT
HEALTH
INFORMATION
FOR:
**HOMEOWNERS
WITH LEAD
PLUMBING**

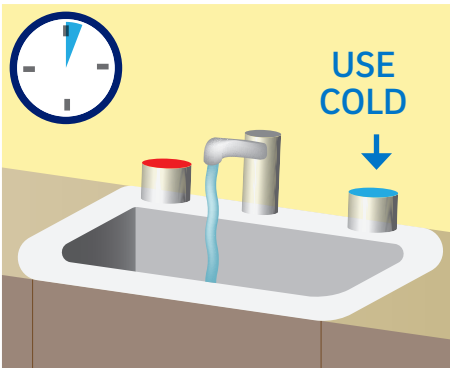
Daily cleaning tips

to clean lead from your home's drinking water pipes



CAUTION

If your home is connected to the City water main by a water service line that has sections made from lead, a toxic metal, it can impact your health. Follow the steps below to clean out your home plumbing until lead plumbing is replaced. **Lead is harmful to everyone. Pregnant women, infants, children under the age of six and adults with high blood pressure and kidney problems are at the most risk.**



Instructions for daily cleaning

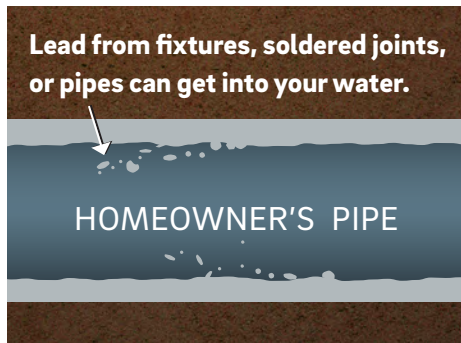
Run cold water from your tap for at least three minutes. This will give you fresh water from the City water main that is safe for drinking, cooking, making baby formula, feeding your pets, making ice, or watering vegetable gardens.

TIP: You can also bring in fresh water from the City water main by taking a shower, washing dishes, using the clothes washer, or flushing the toilets first.

Best time of day?	How often?	For how long?	When to stop?
<ul style="list-style-type: none"> First thing in the morning After you come home from work, if no one has used the water all day 	<ul style="list-style-type: none"> Before using water for any cooking or drinking If no one has used the water for 6 hours or more 	At least 3 – 5 minutes	This ongoing maintenance is good to do regularly, but especially important in any homes that still have lead pipes

Cleaning faucet aerators

Don't let poorly maintained home plumbing prevent you from getting the best water available!

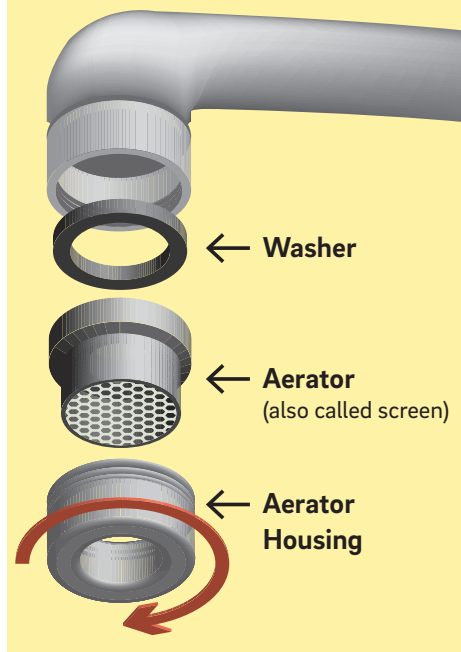


As water stands in your home's plumbing, lead from the soldered joints and old lead pipes can get into your water. Other debris can build up on the aerator, too. It's important to clean faucet aerators and screens to remove any debris from them.

How often should I clean aerators?

It's recommended you replace the aerator annually, and then clean the aerator twice a year. If the aerator appears to need frequent cleaning or becomes worn, the aerator may need to be replaced more often.

What is a faucet aerator?



It's a device attached to the tip of a faucet. It saves water, filters out debris, and prevents water from splashing. As water flows through the screen, it mixes with air and flows more evenly.

Instructions for cleaning aerators

You will need:

- Rag
- Masking tape
- Wrench or Pliers
- Old toothbrush
- White vinegar
- Small plastic tub
- Extra aerators
- Extra washers

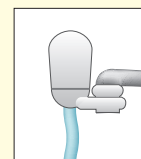
If your faucet has an aerator that you can take off, follow these easy steps:

- ☐ Place a rag in the sink drain in case you drop any pieces.
- ☐ If you need to use a wrench or pliers, wrap masking tape around the tips of the wrench or pliers, or on the aerator. Using tape will keep you from scratching the aerator.
- ☐ Unscrew the aerator.
- ☐ Separate each part— aerator housing, aerator and rubber washer.
- ☐ Remove small bits on the screen and other parts.
- ☐ Soak the parts in white vinegar for a few minutes.
- ☐ Scrub them with a brush.
- ☐ If the aerator and rubber washer are in poor condition, replace them.
- ☐ Put the aerator parts back together.
- ☐ Screw the aerator back onto the faucet.
- ☐ Repeat these steps for all faucets.

Troubleshooting

Can't find the aerator?

Some faucets have hidden aerators. If you have a hidden aerator, follow the manufacturer's instructions.



If you have a water filter attached to a faucet, the faucet will not have an aerator.

How to check your water service line for lead

The City's water mains are not made of lead. However, the water service line running from the water main to your home may be made of lead.



For any questions about lead in your water:

Call our hotline at 215.685.6300.

Our staff will provide information on water testing, safety tips and replacement options.

Lead can also be found in older brass fixtures and valves and in old solder, where pipes are joined.

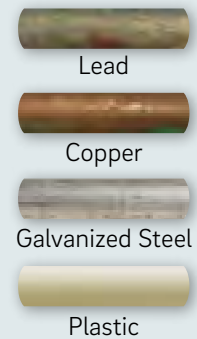


You can test the water service line where it connects to the water meter in the basement.



Water Service Line
May be made of lead, copper, galvanized steel or plastic.

Possible Pipe Materials



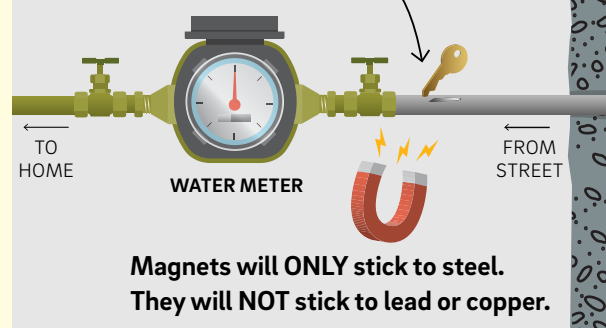
Follow these steps:

You will need:

- Key or a coin
- Strong refrigerator magnet

1. Find the water meter in your basement. Look at the pipe that comes through the outside wall of your home and connects to your meter.
2. Carefully scratch the pipe (like you would a lottery ticket) with a key or a coin. Do not use a knife or other sharp tool. Take care not to make a hole in the pipe. If the scratch turns a shiny silver color, it could be lead or steel.
NOTE: If pipe is painted, use sandpaper to expose the metal first.
3. Place the magnet on the pipe. If a magnet sticks, it is a steel pipe.

Lead is dull, very soft, and will turn a shiny silver color when scratched.



Other ways you can check for lead:

- **Lead test kits can be purchased at your local hardware or home improvement store.** These kits are used to test what the pipe is made from—not the water inside. Look for an EPA recognized kit.
- **A licensed and insured plumber can inspect your pipes and other plumbing for lead.** Replacing an older brass faucet or valve may be a simple way to reduce the lead in water.

Schedule DM-7: Utility Wide Strategic Energy Plan



Utility Wide Strategic Energy Plan

Updated Winter 2017



PHILADELPHIA
WATER
— DEPARTMENT —

The Philadelphia Water Department strives to become a model energy efficient utility of the future by recovering its intrinsic resources, reducing greenhouse gas emissions, and pursuing resilient and economically beneficial energy operations.

City Of Philadelphia
**Philadelphia Water
Department**
Debra A. McCarty
Commissioner



Cover Photo: The solar panel array located at the Southeast Water Pollution Control Plant (Photo: PWD Staff).

Utility Wide Strategic Energy Plan

Executive Summary

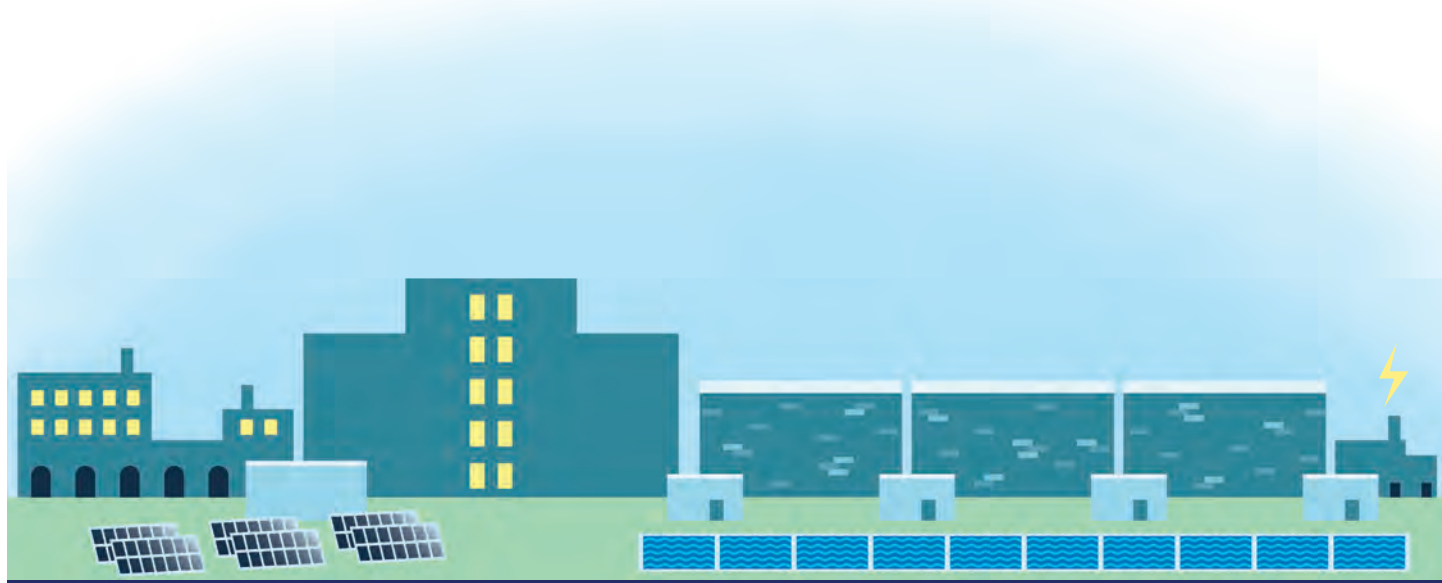
An innovative energy management approach is essential to PWD's commitment to sustainable utility operations. The scale of the Philadelphia Water Department's water and wastewater treatment, distribution, and collection services requires a large annual energy expenditure of approximately 1.7 trillion BTUs. Recognizing the interdependency of water and energy infrastructure, PWD manages the large-scale energy requirements for its operations by carefully monitoring and evaluating energy usage, and pursuing resource recovery projects that increase our energy independence.

PWD operational staff have demonstrated a long history of leadership in energy management via strategic load shifting, demand management, the installation of energy efficient equipment, and, more recently, power generation. Further, our wastewater treatment plants present substantial opportunities to reduce our carbon footprint, via the recovery and use of fuel generated onsite from the anaerobic digestion process. PWD's Utility Wide Strategic Energy Plan responds to the urgency of climate change proactively, by mitigating our contribution to climate change, in tandem with the department's climate change adaptation efforts.

Implementing the objectives outlined in this plan will increase operational flexibility and resiliency. Pursuing financially sound energy efficiency and resource recovery projects can provide budget certainty by protecting PWD operations from energy rate volatility. In turn, ratepayers can benefit from PWD's diverse energy portfolio while receiving the highest quality, dependable, affordable water and wastewater services.

PWD's Utility Wide Strategic Energy Plan is supported by four core goals:

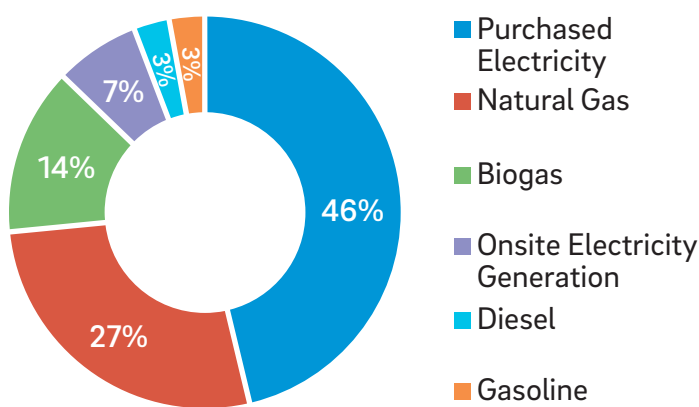
- I.** Strive to maintain a stable energy footprint by increasing energy efficiency at our facilities.
- II.** Reduce greenhouse gas emissions 50% by 2030.
- III.** Continue to pursue renewable energy generation and resource recovery at our facilities.
- IV.** Maintain or reduce energy costs and provide budget certainty to the ratepayer.



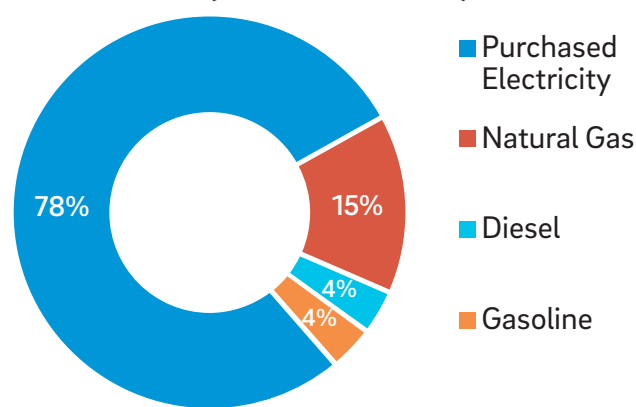
Energy Management at the Philadelphia Water Department

The Philadelphia Water Department takes advantage of a diverse energy source portfolio by employing the use of grid-supplied electricity, natural gas, vehicle fuels, biogas, and onsite electricity generation (derived from both biogas and natural gas). Annually, PWD spends approximately \$20 million on energy for drinking water and wastewater pumping stations, wastewater treatment plants, water treatment plants, fleet vehicles, and dozens of other smaller facilities. This energy use results in approximately 150,000 metric tons of carbon dioxide-equivalent (CO₂e), which accounts for about one-third of the City of Philadelphia Municipal Operations' carbon footprint.

Energy Footprint by Fuel Type (MMBTU)



Purchased Energy Costs by Fuel Type (Fiscal Year 2017)



PWD's Energy Program supports the department's commitment to sustainable energy management practices in the operations and maintenance of utility infrastructure. The Energy Program's key roles include:

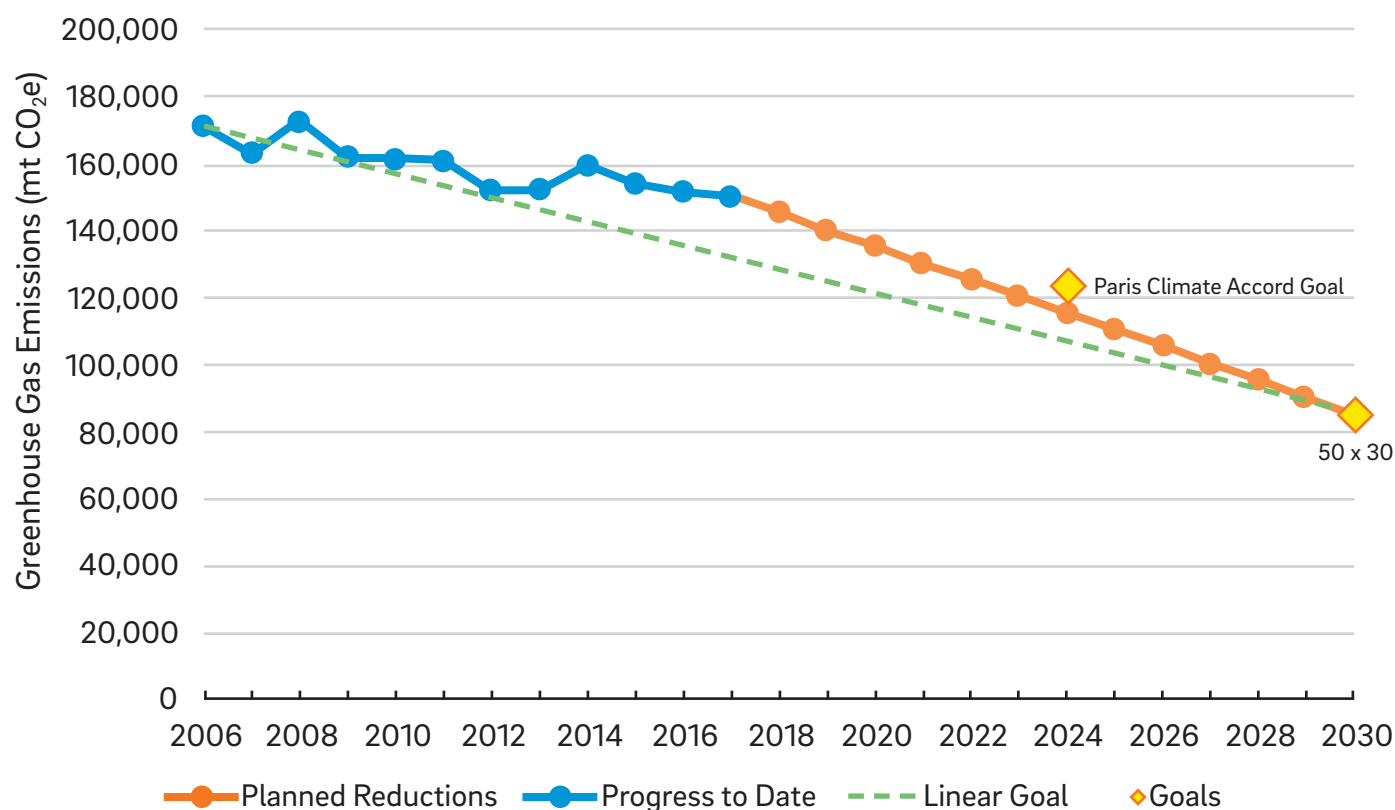
- Monitoring energy use and costs at PWD facilities to ensure reliable and accurate billing;
- Promoting energy efficiency and operational flexibility at PWD facilities by analyzing energy saving opportunities and emerging energy management technologies;
- Monitoring the performance of PWD's current renewable energy projects and identifying new opportunities to reduce PWD's energy footprint.

Water and wastewater treatment and pumping facilities' energy use fluctuates with environmental conditions including varying weather and precipitation flow patterns. Furthermore, regulatory impacts that require changes to treatment processes, or other necessary adjustments in facility operations can cause energy needs to change. Fortunately, the Philadelphia Water Department has already taken many steps toward energy independence, including peak shaving, demand management, and the development of a biogas cogeneration facility at the Northeast Water Pollution Control Plant. In addition, PWD also plans to purchase some electric vehicles in the near future. These actions help us achieve both resilient operations, and energy cost certainty.

Greenhouse Gas Emissions at the Philadelphia Water Department

PWD is a large user of energy and has a correspondingly large carbon footprint. As the City of Philadelphia pursues aggressive greenhouse gas reductions goals – 80% reductions by 2050-- PWD will adopt a parallel approach. While maintaining and enhancing our core business, PWD will focus on energy reduction and the development of alternative energy generation, thereby lowering our carbon impact.

Historical and Projected PWD Greenhouse Gas Emissions at PWD



Since 2006, PWD has reduced GHG emissions by 12%. The use of renewable fuels and onsite electricity generation at our wastewater treatment plants has a positive impact on our greenhouse gas footprint. By taking advantage of more opportunities for energy reduction and alternative energy production, we can continue to reduce our carbon footprint. Furthermore, the City of Philadelphia is committed to cleaning the City's energy supply and moving away from fossil fuel sources of electricity, thereby changing the regional electricity grid. In conjunction with regional and national efforts to clean the regional grid mix, the City assumes that the carbon intensity of the grid will be lowered by at least 33% by 2030 compared to the most current electricity grid emissions factors. Therefore, emissions from the electricity that we purchase for our facilities is expected to trend downward.

Strategic Energy Planning at PWD

Strategy: Increase energy efficiency

Focusing on energy efficiency in our facilities can result in less energy consumption, less waste, and cost savings.

The department's suite of water and wastewater treatment assets present many opportunities for saving energy and costs. Through the capital planning process, facility assets are replaced and upgraded with high-efficiency equipment. Additional energy efficiency upgrades that can improve existing infrastructure and decrease energy consumption will be critical to reaching our greenhouse gas reduction goal. Partnerships with the City's Energy Office and the Department of Energy's Better Plants program will be critical to developing targeted energy investments that will both decrease energy intensity at our facilities, and increase resiliency.

Action	Timeline	Stakeholders
Perform facility energy audits and identify energy conservation measures for implementation	Ongoing	PWD Operations
Maintain electric load profile through off-peak pumping and demand management	Ongoing	PWD Operations
Investigate enhanced performance management tools	Ongoing	PWD Operations Planning & Research
Incorporate energy and greenhouse gas impacts of projects into the capital planning alternatives evaluation process	Ongoing	PWD Operations Planning & Research
Participate in the U.S. Department of Energy's Better Plants program to identify energy and cost saving opportunities	Ongoing	PWD Operations Planning & Research

Strategic Energy Planning at PWD

Strategy: Pursue energy and resource recovery

PWD recognizes that the inherent resources present in wastewater offer opportunities for resource recovery and renewable onsite energy generation. Resource recovery efforts help to reduce costs from purchased fuel and electricity, diversify our energy portfolio, and mitigate our carbon footprint.

PWD's water pollution control plants (WPCPs) not only deliver high quality wastewater treatment services, but they are also resource recovery hubs that can provide a reliable source of onsite energy. A WPCP's anaerobic digesters can safely process high strength wastes that might otherwise become pollutants; the biogas created by digesters can fuel onsite generation systems and displace fossil fuels; and nutrient-rich biosolids are converted to fuel and fertilizer.

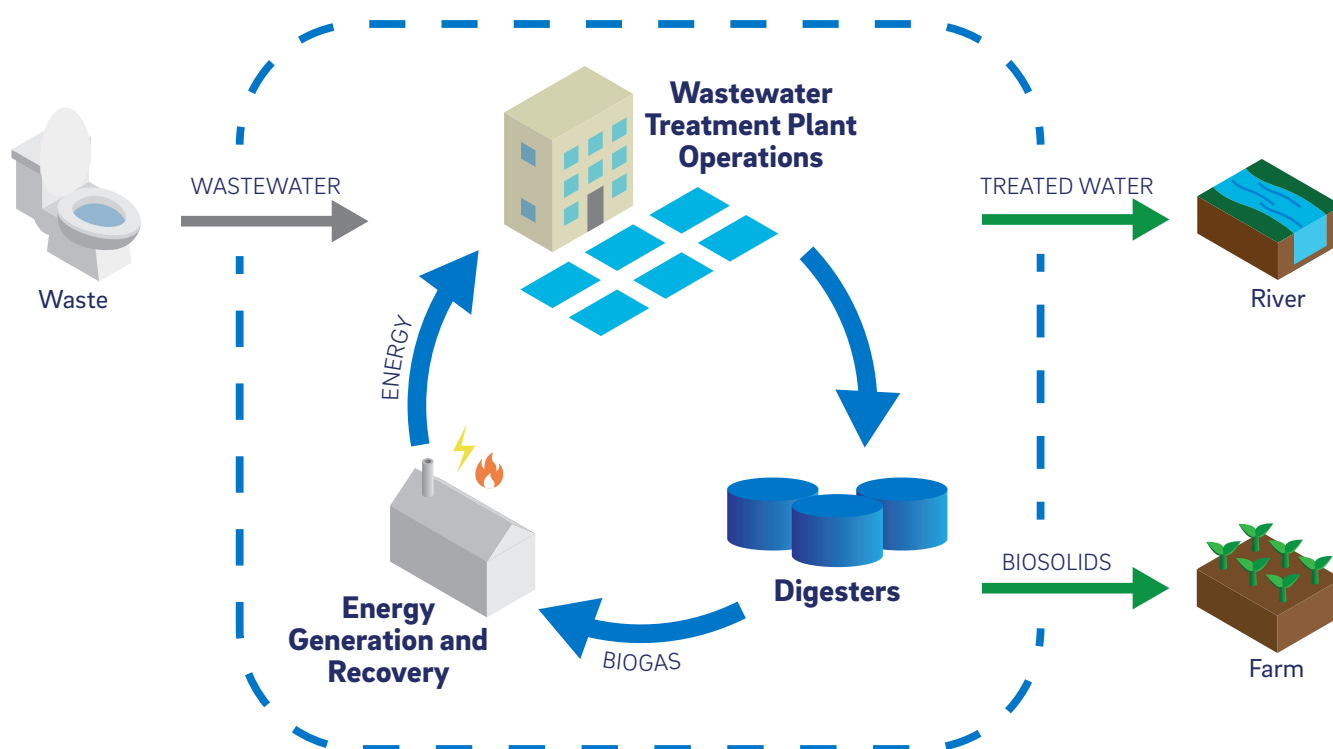
Pursuing financially sound renewable energy and resource recovery projects can provide budget certainty, thus protecting PWD operations from energy rate volatility. In turn, ratepayers can benefit from PWD's diverse energy portfolio while receiving the highest quality, dependable, affordable water and wastewater services.

Action	Timeline	Stakeholders
Optimize biogas production and use	Ongoing	Southwest and Northeast WPCP Operations
Generate increasing amounts of electricity from alternative energy	Ongoing	City Energy Office
Investigate the potential for food waste co-digestion at a wastewater treatment plant	Ongoing	Southwest and Northeast WPCP Operations Planning & Research Philadelphia Zero Waste and Litter Cabinet Streets Department
Collect aircraft deicing fluid through partnership with PHL airport to increase biogas production	Ongoing	Southwest WPCP Operations PHL Airport
Continue to operate solar panel array at Southeast WPCP	Ongoing	Southeast WPCP Operations
Evaluate opportunities for additional renewable energy projects including solar and hydropower	Ongoing	PWD Operations Planning & Research

Resource Recovery Facilities

Water pollution control plants do more than just wastewater treatment. In fact, our WPCPs contain many opportunities to increase self-sustaining operations at our plants. For instance, biogas generated from treated wastewater can be used as energy. This free onsite fuel is created in the anaerobic digesters at the SW and NE WPCPs. This fuel can be used to offset natural gas, fuel oil, and electricity purchases and it is nearly free of greenhouse gas emissions. At SW WPCP, biogas is recovered and used in the boilers, and is also conveyed to the biosolids recycling center (BRC) for use in the thermal biosolids drying facility. At NE WPCP, biogas is recovered and sent to the cogeneration system to generate onsite power and heat for plant operations. Opportunities still exist to further optimize the production and use of the inherent resources at our WPCPs.

Resource Recovery Facility: Conceptual Diagram



Resource Recovery Projects: Turning Waste into Energy

Biogas Cogeneration

In December 2013, the biogas cogeneration facility came online at the Northeast Water Pollution Control Plant. The biogas cogeneration system can generate up to 85% of NE WPCP's electricity needs. On average, the captured biogas from this facility produces 35 million kilowatt hours of energy, enough to power 3,365 homes in Pennsylvania for one year. The PWD Energy Program works with the City's Energy Office who facilitates the sale of renewable energy credits (RECs) created by this project, adding to its value.



The Northeast WPCP biogas cogeneration facility (Photo: PWD staff).



Typical commercial aircraft being deiced prior to takeoff (Photo: Rick Mullin).

Aircraft Deicing Fluid Co-Digestion

In the winter of 2008, PWD began accepting aircraft deicer fluid (ADF) from the Philadelphia International Airport to feed the digesters at its SW WPCP. The addition of ADF increases the production of energy rich methane gas that PWD can use to decrease fossil fuel consumption, thereby reducing the Department's dependence on non-renewable energy sources.

Biosolids Recycling Center

For decades PWD has been safely treating and processing biosolids, the residuals resulting from the wastewater treatment process, from our three WPCPs. Since 2012, biosolids have been thermally dried into environmentally beneficial, pathogen-free pellets used as organic fertilizer and renewable fuel. Prior to the thermal drying process, biosolids were composted, applied to farmland as fertilizer, or landfilled. Many trucks were required for the transport of this material. Currently operations are contained at the thermal drying facility, resulting in far less greenhouse gas emissions from truck traffic.



A handful of Class A biosolid pellets (Photo: Synagro).



Philadelphia Water Department

1101 Market Street

Philadelphia, PA 19107

215.685.6300

www.phila.gov/water

Schedule DM-8: Climate Change Adaption Program

The Climate Change Adaptation Program

The Philadelphia Water Department (PWD) is a combined drinking water, wastewater, and stormwater utility that provides drinking water to approximately 1.6 million customers and wastewater services to 2.2 million customers in Philadelphia and the surrounding suburbs. As PWD strives to be America's model 21st century urban water utility, innovative technologies, leading research and adaptive management strategies play a critical role in all services. In 2014 PWD developed a Climate Change Adaptation Program (CCAP) to better understand the impacts that climate change will have on the drinking water, wastewater and stormwater systems, and how to plan and invest for a future that will look different from the past.

WHY? Impacts from climate change are now inevitable. There is scientific consensus that climate change impacts in Philadelphia will include:

- **more rain**
- **extreme storms**
- **higher air temperatures**
- **rising sea levels**

Drought may also increase in duration and frequency. These impacts will challenge the functionality and reliability of PWD drinking water, stormwater and wastewater infrastructure.

HOW? CCAP will perform a comprehensive risk assessment and develop adaptation strategies to inform existing programs and plans, major investments and guide operational and design standards. This will help ensure that climate change adaptation is integrated into ongoing infrastructure replacement planning and system upgrades. The CCAP will proceed in four phases:

- 1 Vulnerability Survey
- 2 Technical Risk Assessment
- 3 Adaptation Strategy Development
- 4 Adaptation Strategy Implementation

Adaptation is the alteration of human systems in response to or in anticipation of shifting climate conditions in order to minimize harm and exploit opportunities resulting from climate change impacts.

- IPCC AR4, 2007

WHEN? The process is estimated to take several years, during which CCAP will characterize climate-related risks to the utility and develop appropriate adaptation strategies to reduce risk and increase resilience. Several PWD programs and initiatives already increase climate resilience including the Green City, Clean Waters Program, Source Water Protection Program, Storm Flood Relief Program, Ecological Restoration Group and the Operations Unit, which manages the efficient operation of drinking water and wastewater facilities and infrastructure systems.

OUTCOME: CCAP will identify strategic upgrades, design recommendations and planning criteria to inform how PWD can minimize the impact of climate change and ensure clean, safe drinking water and environmentally progressive wastewater and stormwater services.

