

CHAPTER 3:

Drinking Water

INTRODUCTION

Having an adequate drinking water supply is critical to public health. An adequate and safe supply of high quality water assures that people have water to meet every day human needs for drinking, cooking and bathing. Well protected water sources reduce or minimize chemical treatment which lowers delivery costs and works to assure affordability for all customers of public drinking water systems. Citizens and visitors to Connecticut count on their drinking water to be plentiful, safe and free of contamination. People expect that the public water supply will never be interrupted and will be available to meet all needs, at all times, especially during emergency situations. Public Water is counted on to serve every day purposes, from human consumption, to fire protection, to serving new businesses, and watering backyard gardens. People are generally unaware of how water is protected, treated and delivered to water system customers.

The multi barrier approach to the delivery of safe and adequate public drinking water is employed in Connecticut. A myriad of protective measures and laws work to minimize risk to public health for the state's drinking water supply that concern land use and ownership, proper treatment levels, adequate testing, security from natural and manmade threats, and appropriate levels of oversight. Connecticut's public health laws work to protect the state's drinking water sources and proactively minimize risk of source contamination.

Connecticut's drinking water laws are some of the strongest and most protective in the country. It is imperative that the CT DPH have sustainable state and federal funding support to ensure it has the capacity to implement

and enforce these laws in Connecticut, and prevent drinking water disasters such as those listed below:¹

- The waterborne outbreak in Milwaukee, Wisconsin in 1993 that sickened over 400,000 persons and killed over 100 persons.
- The E.coli outbreak in Walkerton, Canada in 2000 that killed 7 people and sickened thousands.
- The toxins found in water in Toledo, Ohio in 2014 that shut down the drinking water supply to over 500,000 persons.
- The chemical spill in West Virginia in 2014 that led to a tap water ban to over 300,000 persons.

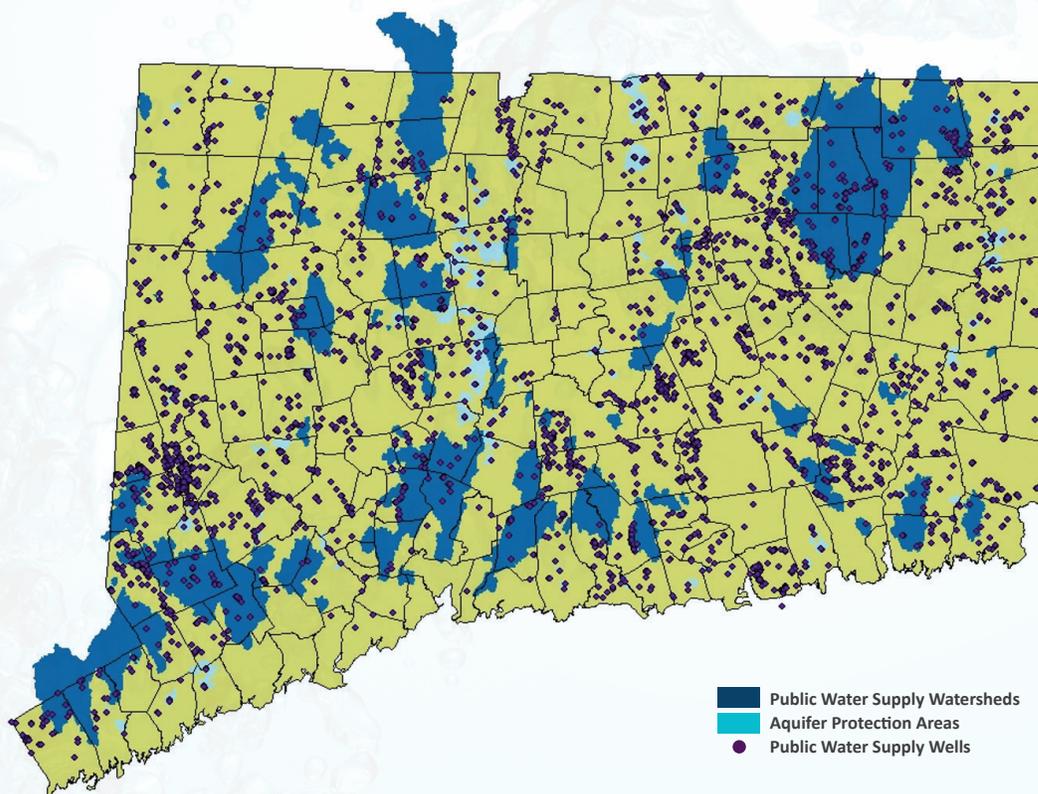
- The ash spill in North Carolina in 2014 that impacted safe drinking water supply to many communities.
- The toxic water spill into a river in Colorado in 2015 that affected drinking water supply to many communities.
- The Legionella outbreak in New York in 2015 that sickened over 100 persons and killed 12 people.
- The ongoing water quality crisis in Flint, Michigan that began in 2015 due to a change in the source of supply providing drinking water to Flint. The change in the drinking water source caused high levels of lead in the drinking water and a Legionella outbreak. As a result of high lead levels in the drinking water, the blood lead levels of many children were elevated.

There has been a long standing foundation within the CT DPH that high quality, well protected source water will be utilized to serve the people of Connecticut their public drinking water.

This foundation, from over 100 years ago, is carried forward in CT DPH laws and regulations that uniquely protect source water quality. Two such laws are: 1) the prohibition of sewage treatment plant discharges into the state's surface water reservoir watershed areas; and 2) protecting over 100,000 acres of water company-owned land. Both laws protect drinking water quality by preventing contaminants from entering into public drinking water sources. Both public health laws are unique to Connecticut and have been in place for nearly 50 years. Both assure that the introduction of harmful chemicals into source waters are minimized and are part of a multi-barrier approach to providing safe drinking water to residents.

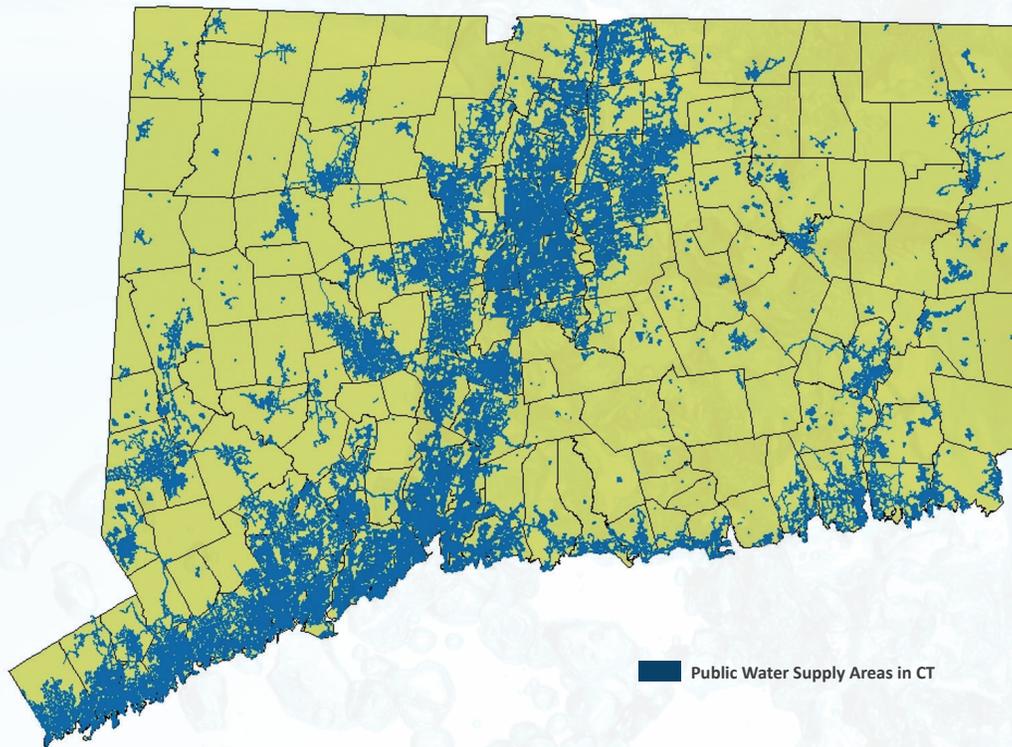
The responsibility to assure the purity and adequacy of the State of Connecticut's public drinking water supplies lies with the DPH Commissioner. CT DPH's regulatory responsibilities have existed since the early 1900s. State law was then enhanced in 1974 by the Environmental Protection Agency's (EPA) enactment and, subsequently, CT DPH's role as the primacy agency tasked with enforcement of the Federal Safe Drinking Water Act (SDWA) in 1976.

FIGURE 3.1: Public water sources, CT, 2018



Source: CT DPH Drinking Water Section Safe Drinking Water Information System. Data analyzed July 2019.

FIGURE 3.2: Large community Public Water System service areas, CT, 2018



Source: CT DPH Drinking Water Section Safe Drinking Water Information System. Data analyzed July 2019.

Responsibility for safe and adequate treatment, testing, and delivery of the state's public drinking water lies with approximately 2,500 public water systems (PWSs) as well as the trained certified operators of these systems. These PWSs serve a total residential population of 2.9 million people each day, (**Figure 3.1**). Public water system owners must routinely test their water quality to maintain compliance with federal and state requirements. They are required to notify their customers if sample results do not meet health standards. Additionally, community public water systems are required to deliver a Consumer Confidence Report, also known as an annual drinking water quality report, to their customers by July 1 every year. This provides customers with information on their water quality, where it comes from, and where they can obtain additional information.

A PWS must be able to, under all circumstances, provide safe public drinking water to residents and businesses. This includes critical facilities such as hospitals, nursing homes, and fire hydrants. A partial or complete loss of supply to residences, schools, food service establishments, etc., can cause the quality and quantity of drinking water supply to become compromised.

The CT DPH directly regulates each of the 2,500 PWSs that operate over 4,000 ground water and 150 reservoir systems through the requirements of the SDWA. This includes quality tracking, system inspection, source protection, water system component approval, compliance and enforcement. A PWS is a potable water supplier that serves 25 or more people, and in Connecticut there are approximately 2,000 non-community PWSs and 500 community PWSs. Shown in **Figure 3.2** are areas served by public drinking water in the State of Connecticut by approximately 500 community PWSs. A community PWS services 25 or more residential customers, where a non-community systems serves 25 or more non-residential customers such as a school or business.

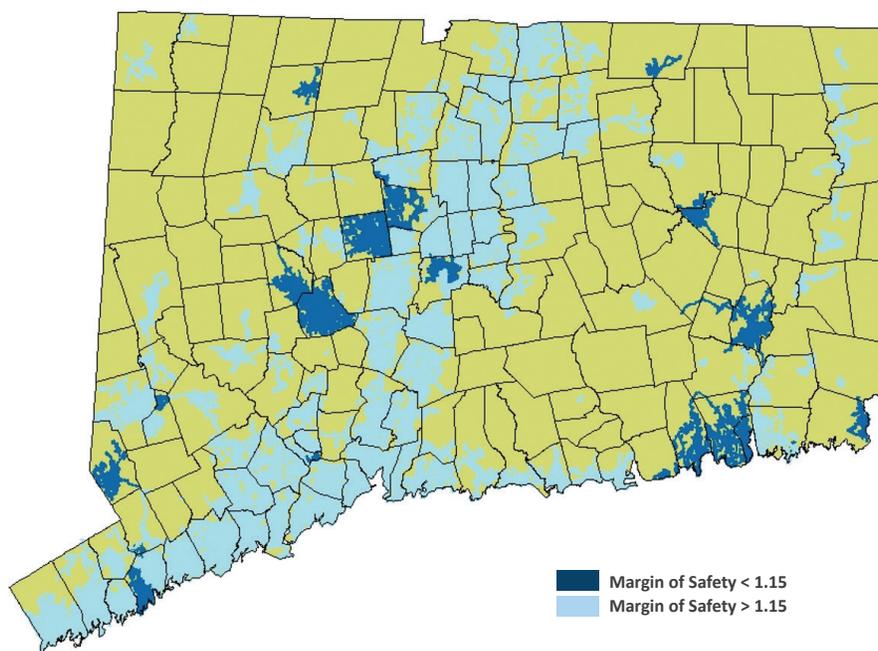
MAINTAINING CONNECTICUT'S PUBLIC DRINKING WATER SUPPLIES

Public drinking water quality and quantity issues have recently captured national attention following the water quality disaster in Flint Michigan in 2016, as well as, the 2016/17 drought in Connecticut. These events, along with the focus on a growing list of emerging potential water quality contaminants, have captured the attention of drinking water consumers, a growing list of stakeholders, and the general public when it comes to drinking water, human health, and public health protection.

Community PWSs are required to maintain a water supply capacity that exceeds demand and should have a margin of safety of supply over the demand for water that exceeds 15%. It is important for a PWS to maintain an adequate safety factor to meet water supply demand as to not deplete its water supply. Planning ahead for future growth in water demands is important to mitigate the loss of water and contamination. The ratio

of water supply capacity to demand can detail a water system's ability to meet demands in the long-term. A ratio of 1.15 or higher is considered adequate. Of the 80 large community public water supplies, 87% meet the 1.15 margin of safety benchmark. A large PWS is defined as serving over 1,000 people. Below, **Figure 3.3** shows the service areas of the large community PWSs with a 1.15 margin of safety based on 2018 data.

FIGURE 3.3: Large community public water supply by margin of safety, CT, 2018



Source: CT DPH Drinking Water Section and Milone & MacBroom, Water Utility Coordinating Committees, Coordinated Water System Plans, Plans Approved December 2018.

CHALLENGES TO PUBLIC DRINKING WATER

There are many short-term and long-term challenges in the provision of safe and adequate public drinking water. The following seven issues pose major challenges that the PWS and CT DPH continually work to address.

Drought

The Drought of 2016 and 2017 significantly impacted Connecticut resulting in CT DPH issuing three Emergency Administrative Orders to large PWSs affecting well over 360,000 people in Greenwich, Stamford, Darien, New Canaan, Waterbury and Danbury. These CT DPH Orders were issued to assure that these water supplies could be maintained by calling for mandatory water use restrictions. The order required PWSs to take swift action to assure that people conserved water, as well as having water to consume throughout the emergency. Water supplies never ran dry. However, reservoirs in southwestern Connecticut reached severely low levels and other water sources needed to be piped overland to fill dwindling reservoirs.

Impact varies on PWSs statewide and regionally. Tracking, forecasting and working to implement the guidance of the state Drought Plan (updated 2018) is important to assure proactive steps are taken. www.ct.gov/waterstatus/lib/waterstatus/2018.11.06_state_drought_plan_adopted.pdf.

Emerging Contaminants

The focus of the SDWA and CT DPH regulations is to assure that water is safe to drink. Existing and emerging contaminants are a consistent focus for PWSs and CT DPH to continue to assure safe drinking water. Lead, per- and polyfluoroalkyl substances (PFAS), cyanotoxins, chloride, sodium, Legionella and manganese have surfaced as the leading challenges of the past few years. These 7 contaminants have dominated significant national discussions and represent a list of growing concerns for customers of PWSs. Most of the contaminants listed below are not regulated under the SDWA.

LEAD

The most common sources of lead in drinking water are lead pipes, faucets, and plumbing fixtures. Certain pipes that carry drinking water from the water source to the home may contain lead. Household plumbing fixtures, welding solder, and pipe fittings made prior to 1986 may also contain lead.

Lead can enter drinking water when a chemical reaction occurs in plumbing materials that contain lead. This is known as corrosion — dissolving or wearing of metal from the pipes and fixtures. This reaction is more severe when water has high acidity or low mineral content. How much lead enters the water is related to the following:

- acidity or alkalinity of the water;
- types and amounts of minerals in the water;
- amount of lead that water comes into contact with;
- water temperature;
- amount of wear in the pipes;
- how long the water stays in pipes; and
- presence of protective scales or coatings in the pipes.

The CT DPH Drinking Water Section (DWS) instituted a variety of initiatives and actions that are more proactive than the current Federal EPA Lead and Copper Rule. The DWS instituted the following as it concerns lead results and PWS enforcement:

- Issued 90 Administrative Orders to PWSs that had lead exceedances of the current lead Action Level of 15 parts per million. Orders are issued to accelerate the timing of public notice, provision of public education information and corrective action which includes protective measures such as treatment system installation or upgrade.
- Drafted and issued water system guidance to the state's schools and daycares to include the following two documents: https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/dph/drinking_water/pdf/DWS_Circular_Letter_2019-17_School_Child_Care_Flushing.pdf and https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/dph/drinking_water/pdf/Reducing-Lead-in-Drinking-Water.pdf.
- Worked with funding agencies to assist schools that are also PWSs.
- Assured elevated lead levels are shared with the public quickly and effectively.

- Assured strict adherence to invalidation process under Federal Law.
- Applied for the WIIN Act Lead Grant and received award in October 2019 to test for lead within disadvantaged communities who have children with elevated blood lead levels.

The CT DPH DWS plans to continue the above actions and proactively address the new Federal EPA Lead Rule once final. New draft Lead and Copper Rule was announced on October 10, 2019 and the DPH plans to review and share comments with EPA.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Per- and polyfluoroalkyl substances are a group of manufactured chemicals that are collectively referred to as PFAS. PFAS are used in a variety of products and applications including non-stick cookware, upholstered furniture, clothing, food packaging, and firefighting foam used to extinguish petroleum fires. These substances are not found naturally in the environment. They do not break down easily and are extremely persistent in both the environment, especially in water, and the human body. It is estimated that there are thousands of PFAS in production.²

Beginning in 2013, the EPA required that all PWSs serving more than 10,000 individuals test for six PFAS compounds. Connecticut's large PWSs conducted multiple rounds of testing from 2013 to 2015 and did not detect PFAS in the water from their sources of supply. These sources of supply provide drinking water for over 2.4 million daily customers in CT.

The Commissioners of the CT DPH and the Department of Energy and Environmental Protection (DEEP) were directed by Governor Ned Lamont in July 2019 to lead an Interagency Task Force (www.ct.gov/ctpfastaskforce) that was established to address PFAS in Connecticut. The Task Force delivered a draft PFAS Action Plan to Governor Lamont on October 1, 2019 and published the draft for a 15 day public comment period. A final Action Plan was shared with the Governor and published on November 1, 2019.

This Action Plan contains a strategies to:

1. Minimize human health risk for Connecticut residents;
2. Minimize future releases of PFAS to the environment; and
3. Identify, assess, and clean up historic releases of PFAS to the environment.

At the final PFAS Task Force meeting the three key takeaways were presented on behalf of the PFAS Task Force's Human Health Committee. It was found that communication is critical in disseminating data to the public.

CYANOBACTERIA

Algae and Cyanobacteria are microscopic plants which grow in lakes, rivers, and most other bodies of water. Most types of algae found in lakes and rivers are harmless to humans and are an essential part of the aquatic food chain. Cyanobacteria, also known as blue-green algae, is actually harmful bacteria that can grow in nutrient rich water. Under certain conditions, cyanobacteria can rapidly grow in large quantities in what's called a harmful algal bloom (HAB); identified by their bright green discoloration and unpleasant smell. Cyanobacteria are particularly harmful because of the toxins they release, known as cyanotoxins. There are a variety of cyanotoxins that can affect different organs within the body including the liver, nervous system or skin and all are considered health hazards. Currently these are unregulated and are being studied under the EPA SDWA Unregulated Contaminant Monitoring Rule 4.³

The quality and safety of drinking water can be threatened by cyanobacteria which can be caused by increasing water temperature, due to climate change, and nutrient loading. Due to the potential threat to human health, there is a need to review nutrient loading from drainage area land uses. This is an emerging water quality issue which is recognized in numerous state plans and will be further studied over the next five years. Grants under the USDA Farm Bill, Long Island Sound, Clean Water Act and other opportunities are being pursued in order to analyze source water quality, land use, and develop proactive protection measures. The following work items are important to proactively address climate change and cyanobacteria for the state's drinking water supply:

- Work to implement the 2018 Water Utility Coordinating Committee Regional Plan, the 2018 DWVAR Plan, as well as the 2018 State Water Plan.
- Work to secure funding to focus on nutrient loading reduction and implement proactive measures to address.
- Work to continue as well as develop new partnerships to address climate change impact to drinking water quality and quantity.

SODIUM & CHLORIDE

CT DPH worked with the Connecticut Environmental Health Association (CEHA) to develop a national Ad Hoc Working Group. This group developed a mission statement and set goals to focus on supporting efforts to move forward with Training Applicators of sodium chloride products, as well as development of best management practices in order to protect public drinking water quality.

LEGIONELLA

Legionella is a type of bacterium found naturally in freshwater environments, like lakes and streams. It can become a health concern when it grows and spreads in human-made building water systems. People who get sick after being exposed to Legionella can develop two different illnesses: Legionnaires' disease and Pontiac fever. People can get Legionnaires' disease or Pontiac fever when they breathe in small droplets of water in the air that contain Legionella. Maintaining building water systems is one of the keys to preventing infection.⁴

The Drinking Water Section (DWS) has worked across the agency to assist with protective measures to address legionella. Working with the CT DPH Health Care Licensing Bureau, CT DPH Toxicologists and Epidemiologists the CT DPH DWS works as part of a team of Subject Matter Experts on the following:

- Participate on the CT DPH Legionella Team.
- Provide drinking water expertise on water quality parameters and the implementation of Water Management Plans.
- Draft a legionella strategy to address the addition of treatment to health care facilities and buildings served by a PWS.
- Build expertise within the DWS on legionella mitigation and treatment.

Aging Infrastructure

Connecticut's public drinking water infrastructure has aged and is in need of replacement and upgrade with over \$4.0-billion in investment over the next 20 years. Aged drinking water infrastructure (pipes, tanks, pumps, etc.) can fail and lead to water loss and/or water contamination. The impact is significant, as a large percentage of Connecticut's community PWSs infrastructure are well over 50 years old. CT DPH works with PWSs to focus on upgrading water system components and providing financial assistance through its DWS Drinking Water State Revolving Fund loan program; focusing on disadvantaged communities.

Heathy Equity

Connecticut's first State Water Plan, as approved in 2019, determined that the state has plentiful water to meet the current and projected need for public drinking water. While there is ample water supply, the state must strike a balance on water needs and usage. Providing this balance is critical for water sustainability particularly as the State Water Plan is implemented over the next 5 years. As a member of the State's Water Planning Council, the CT DPH works to assure that public health protection is understood and equitable.

Moreover, there could be a loss of high quality water for human consumption and therefore a loss of margin of safety and reduction in human health protection if sources of water supply are of lower quality. This is addressed by:

- Working with stakeholders to recognize and partner to implement the 2018 Water Utility Coordinating Committee Regional Plans. <https://portal.ct.gov/DPH/Drinking-Water/WUCC/Water-Utility-Coordinating-Committee> as well as the 2018 State Water Plan <https://ct.gov/water/site/default.asp>.
- Developing measures, metrics, and action items to track health equity and public drinking water to tie back to the State Water Plan and public health protection.
- Working with public health officials on the development of this Health Equity and Public Drinking Water Metric.
- Presenting metrics to the public and stakeholders.

Small Water System Capacity/

Sustainability/Resiliency for Technical Managerial and Financial Aspects of Public Water System Management

There are 330 small community PWSs that could struggle to meet the daily requirements of the SDWA and state laws. This challenge has become more pronounced as the SDWA requirements have been enhanced over the past decade. With each new law the business of owning a small community PWS is more complicated and expensive. This can and has led to small community PWSs takeovers by larger PWSs. Over 10 small community PWSs that have been completed. The work outlined below must continue in order to address this issue:

- Work to implement the 2018 Water Utility Coordinating Committee Regional Plan, the 2018 Drinking Water Vulnerability Assessment and Resiliency Plan (DWVAR Plan) as well as the 2018 State Water Plan as it concerns small community PWSs system capacity and sustainability.
- Work to optimize PWSs and continue to work with EPA and other states by active participation on the Areawide Optimization Program (AWOP).
- Work to implement a 2018 law requiring asset and fiscal management plans for small community systems.
- Work to fully implement CT DPH Capacity Development Strategy.
- Work to train certified operators and continue to develop the certified operator workforce.

Emergency Response

Tropical Storms of 2011 and Hurricane Sandy in 2012 impacted well over 100 small community PWSs and caused hundreds of boil water advisories. The Three Storm Strategy (TSS) first developed in 2012 following Storms Sandy, Irene and Alfred was

developed to assure the ongoing actions to address small system resiliency. In addition to the TSS the following efforts must continue:

- Work to assure the availability of skilled CT DPH employees that can respond in a timely and comprehensive manner.
- Work to assure that laws are appropriate to address the need of adequate and timely notice to customers affected.
- Work to assure that PWSs contain the capacity to respond appropriately.
- Work with the water industry, local health directors and other partners to assure that emergency response is well coordinated and effective to assure safe and adequate drinking water.

Affordability of High Quality Drinking Water

There are over 500 community PWSs with most serving a small number of residential customers. When comparing small community systems, the sources of supply and financial capacity vary greatly. Some sources of supply are low yielding and of poor raw water quality which requires additional water sources and treatment resulting in higher costs. If these sources and systems are located within disadvantaged communities, the affordability and therefore quality of system upkeep and water supply delivery becomes challenging for water systems with a smaller customer base. The work and focus of the CT DPH will be to:

- Work to assure that disadvantaged communities have the ability to address water quality and quantity issues.
- Work to offer financial Drinking Water State Revolving Funds (DSWRF) and technical assistance.
- Work to assure that current high quality water sources are sufficiently protected from harmful effects and available for all.

COMPLIANCE AND ENFORCEMENT

The CT DPH DWS has consistently inspected between six to seven hundred PWSs per year. This is a requirement of the SDWA. System inspections can range from a couple of days to two weeks for larger systems. System violations and/or significant deficiencies are noted within engineering system reports and due dates provided for system compliance. System compliance is then followed up by Enforcement staff to assure that violations are corrected.

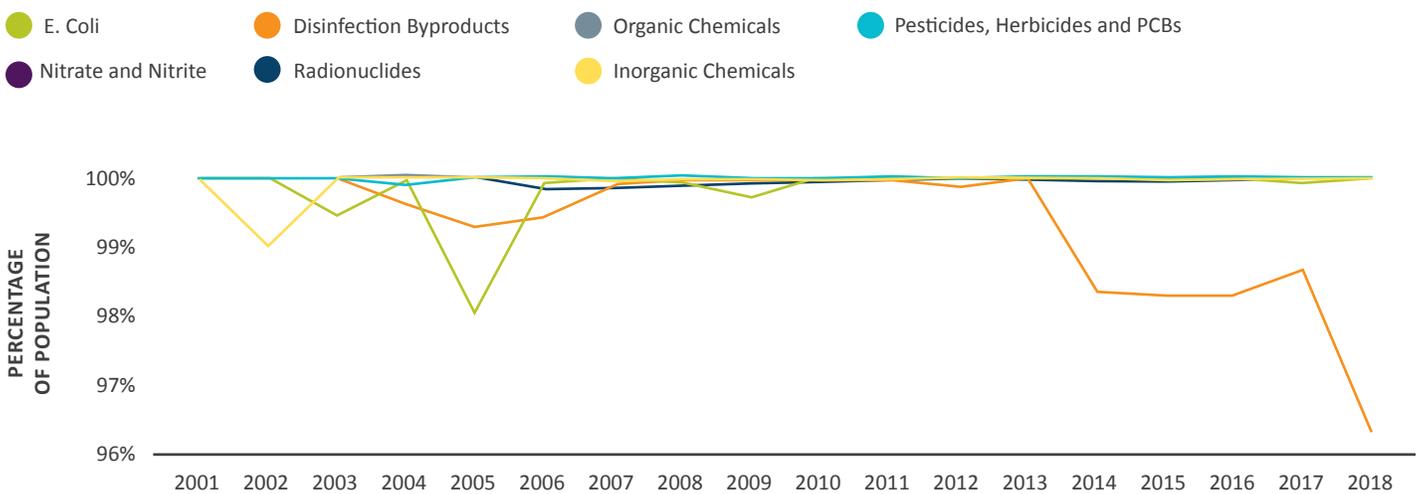
To maintain the drinking water quality of a PWS, maximum contaminant levels (MCL) are monitored by the water systems and compliance is overseen by CT DPH as required under State Law consistent with the EPA’s SDWA (Table 3.1). The MCL is the maximum permissible level of a contaminant that is delivered to any consumer of a PWS.

In Figure 3.4, we see that there has been a slight increase in the number of MCL violations for disinfection byproducts over the last few years. This is primarily due to a change in the Stage 2 Disinfection By-product (DBP) Rule that required water samples to be taken from target locations. This requires systems to determine points that are of most concern, sample them, and determine the running annual average of contaminant levels for each site individually. Prior to this change, MCL compliance was based on an annual average for the overall water system. The CT DPH is working with PWSs to proactively address exposure to DBPs through training, system optimization, and recognition and plan development to address system treatment and hydraulics.

Further CT DPH DWS has worked to institute stricter enforcement of microorganism contamination. Since 2018 the DWS has issued Orders for each confirmed E. coli contamination and required timely corrective action. Corrective actions are tracked and overseen to assure comprehensive measures are instituted. In the end, the Orders assure minimized risk of contaminant exposure. There have been 56 E coli violations in the past 5 years, mostly small systems with unsanitary sources, each of these are addressed within 24 hours of confirmation with DWS engineers assuring quick public notice and return to compliance.

Connecticut consistently ranks in the top state drinking water programs, as compared to the New England Region and the 50 states when assessing public drinking water that meet health based standards. Further, overall public drinking water in Connecticut has consistently since 2008 well exceeded EPA National Targets. Two health based EPA measures are shown in Table 3.2 and associated graphs. These measure the overall drinking water quality delivered to the customers of community public drinking water systems.

FIGURE 3.4: Percentage of the population at community PWSs that did not have a maximum contaminant level violation by contaminant, CT, 2001–2018



Source: CT DPH Drinking Water Section, Safe Drinking Water Information System, Data analyzed March 2019.

TABLE 3.1: Large community public water supply by margin of safety, CT, 2018

CONTAMINANT	EXAMPLES	HEALTH EFFECTS
Microorganisms (bacteria, viruses, protozoa)	E. Coli, Legionella, Cryptosporidium	Gastrointestinal illness (Diarrhea, Cramps, Nausea) Legionnaire's Disease
Nitrate and Nitrites		Methemoglobinemia (Blue Baby Syndrome) Thyroid dysfunction in children and pregnant women
Disinfectants (DBP)	Haloacetic Acids, Total Trihalomethanes, Chlorite & Bromate	Anemia Stomach problems
Disinfection Byproducts	Chloramines, Chlorine & Chlorine Dioxide	Increased risk of cancer Anemia Liver/Kidney problems
Organic Chemicals (Volatile Organic Chemicals and Synthetic Organic Chemicals)	Benzene, Dalapon, Dichloromethane & Di(2-ethylhexyl) Phthalate	Increased risk of cancer Liver problems Reproductive problems Nervous system problems
Radionuclides	Radium 226, Radium 228 & Uranium	Increased risk of cancer Kidney toxicity (Uranium)

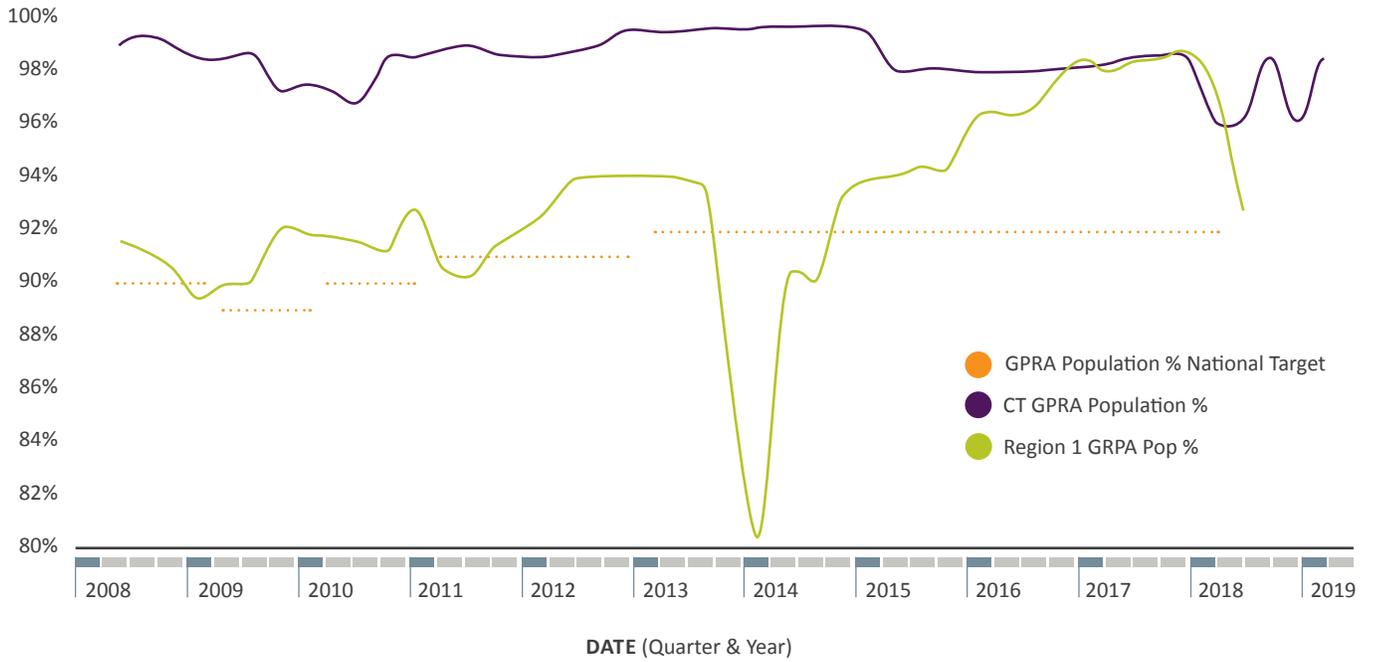
Source: US Environmental Protection Agency, Retrieved from www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations

TABLE 3.2: Government Performance and Results Act (GPRA) National Water Program Measures, CT and US, 2019

EPA NATIONAL WATER PROGRAM MEASURES	2019 CT RESULTS	FY19 EPA NATIONAL TARGET
Percent of the population served by community water systems that receive drinking water that meets all applicable health-based drinking water standards through approaches including effective treatment and source water protection.	98%	92%
Percent of "person months" (i.e. all persons served by community water systems times 12 months) during which community water systems provide drinking water that meets all applicable health-based drinking water standards.	98%	95%

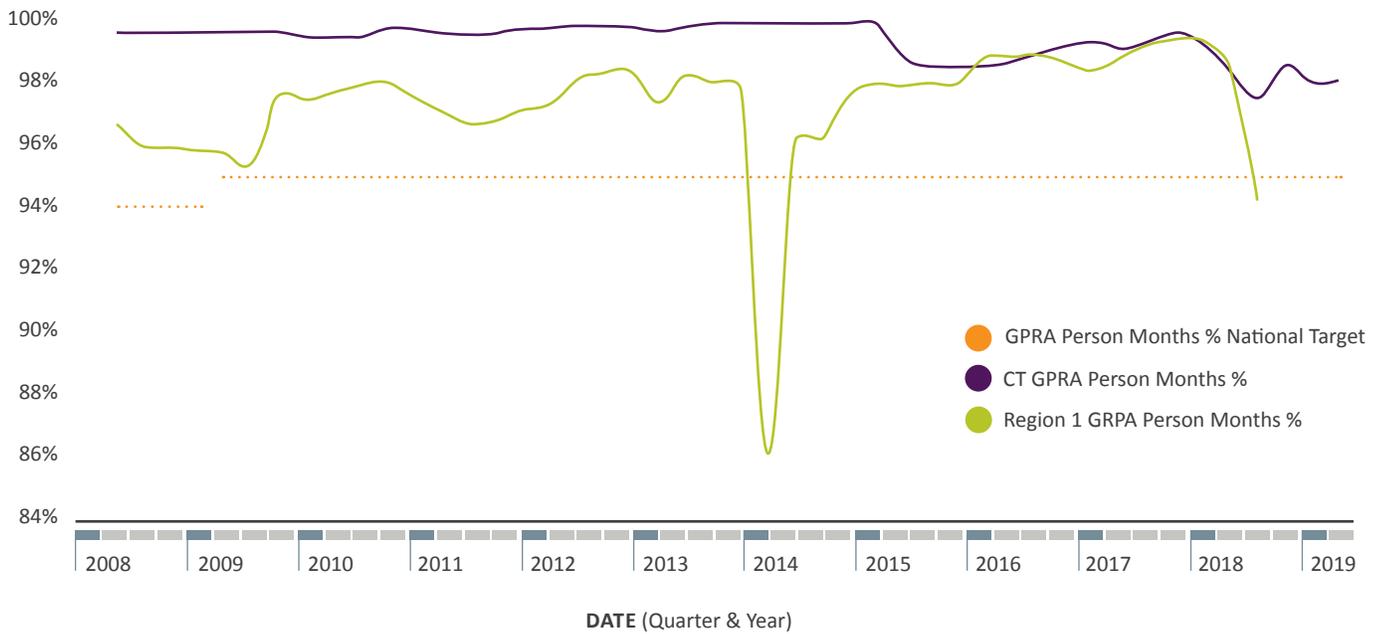
Source: US Environmental Protection Agency, Government Performance Results Act. Data Analyzed September 2019.

FIGURE 3.5: GPRA National Water Program Measures, CT and US, 2008–2019



Source: US Environmental Protection Agency, Government Performance Results Act, Data Analyzed September 2019.

FIGURE 3.6: GPRA Person Months Percentage, CT & US, 2008–2019



Source: US Environmental Protection Agency, Government Performance Results Act, Data Analyzed September 2019.

PROGRAM SPOTLIGHTS

Drinking Water Planning

CT DPH's DWS has many planning tools that will assist with various aspects of public drinking water development, distribution, protection and emergency response.

Accomplishments include the completion of:

- A *Capacity Development Strategy* that will ensure the long-term sustainability of Connecticut's PWSs.
- A national *Drinking Water Infrastructure Needs Survey and Assessment* that documents a total 20-year need for Connecticut of over \$4-billion.
- The *State Water Plan* which is a collaborative effort between the CT DPH, the Department of Energy and Environmental Protection, Office of Policy and Management and the Public Utilities Regulatory Authority. The State Water Plan was prepared to help inform decisions about managing all aspects of Connecticut's water, including drinking water, industrial use, environmental health, agricultural use, energy and recreational use.
- A *Drinking Water Vulnerability Assessment and Resilience Plan (DWVARP)* that assesses current vulnerabilities of drinking water systems and private wells in Connecticut's four coastal counties and identifies strategies to mitigate future storm impacts on areas with drinking water supplies.
- A *Drought Preparedness and Response Plan* that identifies a set of formal operating procedures and administrative guidance for proactive drought planning and response.
- *Water Utility Coordinating Committee* Coordinated Plans for each of the three Public Water Supply Management Areas in Connecticut. The plans will ensure that smart planning decisions are made about the future of Connecticut's drinking water and will guide approximately 2,500 PWSs in Connecticut.
- The *WebEOC Drinking Water Status Controller Board* that allows PWSs to report their system status to the CT DPH during an emergency event through the state web-based Emergency Operations System.

Drinking Water State Revolving Fund (DWSRF) Program

The Drinking Water State Revolving Fund (DWSRF) Program is a federally funded program that provides low interest loans to community and non-profit, non-community PWSs to finance infrastructure improvement projects. Examples include storage tanks, treatment works, and water mains. The program supports and recognizes strong infrastructure sustainability programs that emphasize prevention as a tool for ensuring long term safe and affordable drinking water to Connecticut's residents. The program also places an emphasis on providing loans to small water systems and communities most in need and certain projects may qualify for Federal or State subsidization. PWSs which serve fewer than 10,000 persons are strongly encouraged to apply. <https://portal.ct.gov/DPH/Drinking-Water/DWS/Drinking-Water-State-Revolving-Fund-Program>

- During State Fiscal Year 2019, the CT DPH DWSRF Program committed approximately \$37.4 million in funding for 27 infrastructure projects through 20 funding agreements.
- Since 1999, the DWSRF Program has provided more than \$348 million for 256 projects.
- Federal funding for the state's DWSRF Program is determined by the EPA sponsored national Drinking Water Infrastructure Needs Survey & Assessment. The results of the most recent 2015 survey, which were released in March 2018, showed that the State of Connecticut's estimated need had grown from \$1.394 billion in 2007 to \$4.018 billion in 2011. www.epa.gov/dwsrf/epas-6th-drinking-water-infrastructure-needs-survey-and-assessment

Area Wide Optimization Program (AWOP)

The Area Wide Optimization Program (AWOP) is a program facilitated by EPA that provides training, tools and approaches for state regulatory programs to work with drinking water systems in meeting water quality optimization goals. The optimization goals are set to maximize public health protection through optimization of existing water treatment and distribution facilities (i.e., without major capital improvements) to achieve higher

levels of regulatory compliance for the PWSs. While originally developed to address microbial contaminants, AWOP has expanded beyond the original tools and now includes strategies for addressing distribution system and disinfection byproducts (DBPs) optimization as well. Since 2010, CT DPH is the only New England state that is active in the EPA National AWOP program where it receives direct engineering staff training in public water system engineering optimization measures that can directly address drinking water quality issues. The knowledge and tools learned during Regional AWOP meetings is passed on from CT DPH engineering staff to PWSs in CT in order to help them achieve and maintain compliance with SDWA Rules such as Stage 2 DBP Rule and Surface Water Treatment Rule. In 2019, AWOP training centered on disinfection by-products and data integrity concepts which have been used during all large PWS sanitary surveys. CT DPH hosted a regional AWOP meeting for the second time in April-May 2019, with over 10 states joining the EPA-lead training. The AWOP program has and will continue to serve a critical non-regulatory proactive role in the future protection of state's public drinking water.

Protecting Sources of High Quality Drinking Water

CT DPH DWS created and maintains a dedicated functional unit to implement and enforce statutes and regulations pertaining specifically to the protection of the sources of public drinking water. The Source Water Protection Unit (SWP) is responsible for the purity and adequacy of Connecticut's approximately 4,000 surface and ground water drinking water supply sources.

The SWP Unit maintains a Strategic Plan for the Implementation of Drinking Water Source Protection in Connecticut. The program elements coordinate, manage, and regulate source protection

through the enhancement and oversight of existing source protection laws and regulations, integration with water supply planning, education of local land use officials, and involvement with stakeholders on a continuous basis. This Strategic Plan strives to maintain a minimized risk to public health for 100 percent of source water areas for community water systems (both surface and groundwater) by substantial implementation of the source water protection actions, both regulatory and non-regulatory that are in place to prevent contamination and protect water quality and therefore public health. Regulatory examples include a statutory prohibition on sewage discharges in drinking water sources and a regulatory requirement that water utilities inspect their watersheds annually. A non-regulatory example is the Connecticut Source Water Collaborative, a broad stakeholder group of experts who work through topical source protection issues. Climate change will present an increasing challenge in the protection of drinking water sources. An increase in precipitation may potentially increase flooding events and associated risks to public water system wells while an increase in storm water runoff and in seasonal droughts poses a risk to surface water sources. There is also potential for a longer algal bloom season (starting earlier and ending later) and for more harmful algal blooms with the rise in temperatures as warmer temperatures favor blue-green algae that may produce toxins as well as compounds that impact taste and odor. Stringent source water protection measures will help maintain resiliency of some sources while new and innovative source water protection methods or plant treatment process changes will achieve resiliency even as climate changes.

Maintaining a robust source protection program as part of a multi-barrier approach to protecting drinking water quality and quality is critical. Future efforts must continue to prioritize smart land use planning, climate change adaptation and resilience, and mitigating pollution risks.

REFERENCES

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