



**CONNECTICUT DEPARTMENT *of* PUBLIC HEALTH**  
**DRINKING WATER SECTION**

# **Current Water Quality Challenges**

**Water Quality & Treatment Symposium**  
**November 29, 2018**

Carissa Madonna  
Sanitary Engineer 3  
Rule Implementation Unit

Pat Bisacky  
Environmental Analyst 3  
Source Assessment and Protection Unit

Drinking Water Section  
Connecticut Department of Public Health

# Overview

- Drinking Water Section
- Contaminants of Emerging Concern
  - Cyanotoxins
  - PFAS
  - Chloride
- Safe Drinking Water Rules
  - Revised Total Coliform Rule
  - Groundwater Rule
  - Stage 2 Disinfection Byproducts Rule
  - Lead & Copper Rule

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# CT DPH Drinking Water Section Responsibilities

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- Regulate 2,550 Public Water Systems
- 2.8 million CT Residents Served
  - 3.5 million Total Population
- 550 Community Systems
- 2,000 Non-Community Systems
- 150 Reservoir Systems
- Over 4,000 Groundwater Sources
- Over 350,000 private wells



# CT DPH Drinking Water Section

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## Primacy of Safe Drinking Water Act – EPA

- System engineering reviews
- Treatment/source review & approval
- Drinking Water State Revolving Loan Fund
- Drinking water quality
- Oversight of monitoring and reporting
- Ground water rule
- Revised total coliform rule

## State Statutory Oversight

- Water supply planning and regional planning (WUCC)
- Purity and adequacy of public drinking water
- Water company land regulation
- Recreation permitting, sale of excess water, certified operators, enforcement





# Contaminants of Emerging Concern

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- Cyanotoxins
  - UCMR4 Results to date
  - Challenges
  - Management Strategies
- Per- and Polyfluoroalkyl Substances (PFAS)
  - What are PFAS?
  - PFAS in CT
  - CT Actions
  - Northeastern Actions
  - EPA Actions
  - Drinking Water Section Actions
- Chloride
  - Chloride Overview
  - DWS Chloride Policy
  - Reducing Chloride in Drinking Water Sources



# Contaminants of Emerging Concern

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EPA Definition:

An emerging contaminant (EC) is a chemical or material characterized by a perceived, potential, or real threat to human health or the environment or by a lack of published health standards. A contaminant also may be "emerging" because of the discovery of a new source or a new pathway to humans.

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# Cyanotoxins

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Lake Erie algal bloom, October 2011. Photo: NASA-MODIS



# UCMR4 Monitoring Challenges

- Nine Cyanotoxins and one Cyanotoxin Group
- No detections above the reporting limit through October 2018
- **HOWEVER:**
  - Algal blooms are fleeting
  - Sampling represents a snapshot in time
  - Heavy rain events create conditions conducive to blooms
- What's a public water system to do?



Harmful Algal Bloom Eastern CT, August 2018

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# Be Proactive-EPA Guidance

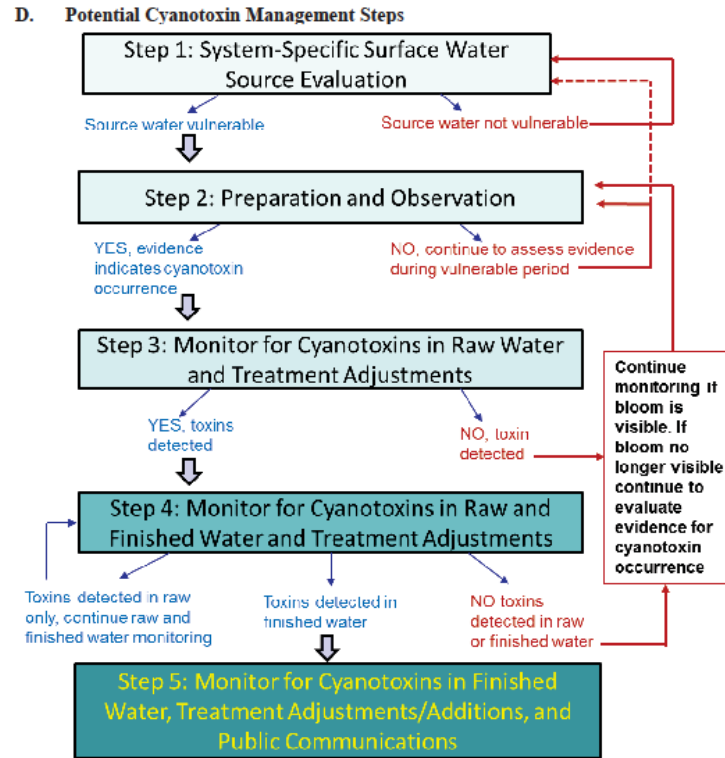


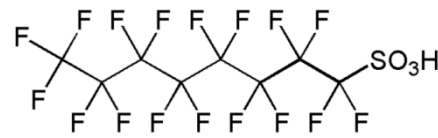
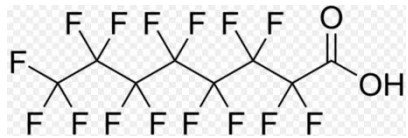
Figure 1. Potential management steps public surface water systems may use to determine whether cyanotoxins are present in raw water or finished drinking water.

Figure 1 depicts potential management steps public surface water systems may use to determine whether cyanotoxins are present in raw water or finished drinking water. The potential management steps contain suggested actions for monitoring, treatment and communication. Step 1 involves conducting a system-specific evaluation to determine if and when a PWS is

# What are PFAS?

PFAS = per- and polyfluoroalkyl substances

- Manufactured compounds, not found naturally
- There are thousands of different PFAS
- Environmentally persistent and stable
  - Does not degrade readily in the environment or in the human body
- Phase out of larger chain PFAS, such as PFOA and PFOS, began in 2000s
  - PFOA = Perfluorooctanoic Acid ( $C_8HF_{15}O_2$ )
  - PFOS = Perfluorooctane Sulfonate ( $C_8HF_{17}O_3S$ )





# PFAS Uses – Not all inclusive

- Oil, water, and dirt repellent coatings
- Non-stick cooking surface coatings
- Coated paper for food packaging
- Personal care products, cosmetics
- Paints and adhesives
- Fluoro-elastomers (gaskets, O-rings, hoses)
- Mist suppressant in metal plating baths, esp. chromium
- Aqueous Film Forming Foam (AFFF)

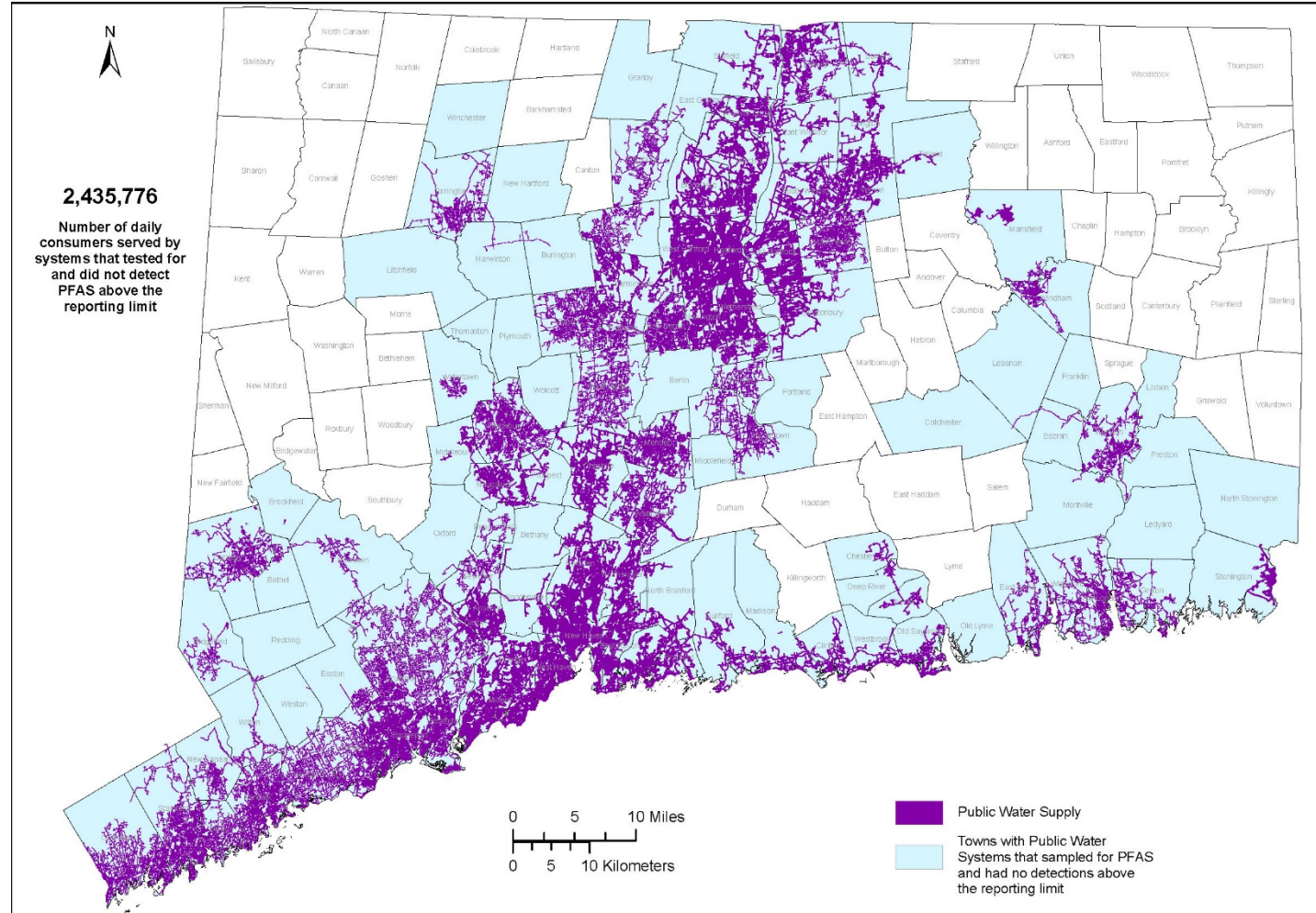


shutterstock - 165457094



# UCMR3 Results 2013-2015

## Connecticut Towns Served by Public Water Systems that have Tested for PFAS



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# What is State of CT doing?

- Created an interagency team with Department of Energy and Environmental Protection (DEEP)
- Drafted a strategy to minimize human exposure to PFAS through drinking water which includes a [CT Drinking Water Action Level](#) of 70 parts per trillion for the sum of five PFAS (PFOA+PFOS+PFNA+PFHxS+PFHpA)
- Trained an interagency team in collecting drinking water samples for analysis for PFAS
- Developed public outreach communication materials and websites
- Collaborating with agency counterparts in the Northeast and Nationally

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# What are other Northeastern States Doing?

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	NY	NJ	NH	VT	MA	RI
Providing Drinking Water Sampling and Testing	✓		✓	Pilot sampling program at schools to be expanded	Targeted for vulnerable systems near PFAS generators	Investigative and targeted sampling schools, daycares and water bottling plants
Extending water mains, providing bottled water or treatment	✓		✓	✓		
Conducting Biomonitoring	✓	✓	✓	✓		
Regulating PFAS	Using EPA HA of 70 ppt for PFOA and PFOS. <b>Evaluating creation of MCL.</b> PFOA and PFOS Hazardous Substance State Superfund Program	<b>DW MCL: 19 ppt PFNA</b>  Proposed: 13 ppt PFOS & 14 ppt PFOA	<b>Legislative mandate for MCL for 4 PFAS</b> by Dec. 2018	<b>DW MCL: 20 ppt for sum of 5 PFAS</b> Hazardous Substance State Superfund Program	DWAL 70 ppt for sum of 5. <b>Potential to set as MCL.</b>	Using EPA HA of 70 ppt for PFOA and PFOS, Considering using sum of 5.
State lab capacity to analyze samples	✓				Proposed	✓
Dept. of Defense lead at military installations	✓		✓		✓	



# What is the CT DPH Drinking Water Section Doing?

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- Responding to identified PFAS Contamination
  - Greenwich/NY Border
  - Utilized an EPA mapping tool to identify and select vulnerable PWS for sample collection
  - Coordinated outreach with Local Health Department; Communicated directly with PWS to be sampled
  - Arranged sample collection/analysis
  - Participated in [public outreach and education](#)



[greenwich https://www.greenwichtime.com/local/article/Residents-ask-questions-on-well-water-in-12914107.php](https://www.greenwichtime.com/local/article/Residents-ask-questions-on-well-water-in-12914107.php)

## Residents ask questions on well water in northwestern Greenwich

By Robert Marchant Updated 6:00 pm, Tuesday, May 15, 2018



Residents of the King Street area meet with health and water-safety officials at an informational event at the Harvest Time Church.

# What is the CT DPH Drinking Water Section doing?

## Drinking Water Section

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- Providing Education, Outreach and Resources to Public Water Systems and Local Health Departments/Districts
  - [Circular Letters](#) 2016-16, 2018-19, 2018-20 and 2018-28
  - Dedicated [PFAS Webpage](#)
- Working with the CT Section Source Protection Committee to standardize the reporting method for the update of Individual Water Supply Plan's inventory of land use activities to include potential PFAS generators as mandated in Circular Letter 2018-20 (and RCSA section 25-32d-3(i)(3))
- Brainstorming ideas on how to use existing laws to address emerging contaminants





# Looking Forward

- EPA has published draft toxicity values for GenX and PFBS. The Draft toxicity assessment is open to comments through January 22, 2019
- Expanded Method 537 to include four additional PFAS (including GenX and Adona)
- EPA's Draft PFAS Management Plan by the end of the Year is expected to include:
  - Initiating steps to evaluate the need for a maximum contaminant level (MCL) for PFOA and PFOS.
  - Beginning the necessary steps to propose designating PFOA and PFOS as “hazardous substances”
  - Developing groundwater cleanup recommendations for PFOA and PFOS.

# Learn More About PFAS

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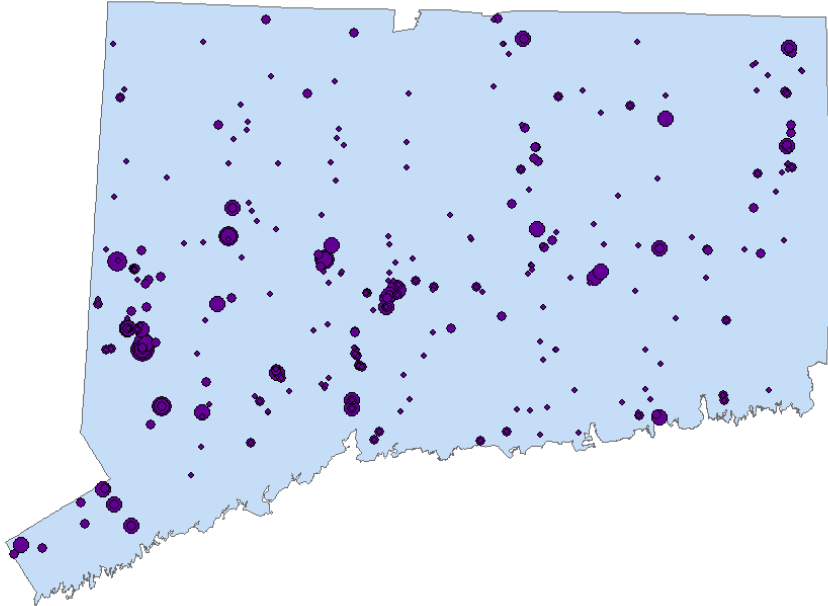
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- DPH Drinking Water Section – [Per and Polyfluoroalkyl Substances](#)
- DPH Fact Sheet: [Perfluoroalkyl Substances \(PFAS\) in Drinking Water Health Concerns](#)
- DPH Private Well [Drinking Water Action Level determination](#)
- CT Department of Energy and Environmental Protection: [Emerging contaminants & PFAS](#)
- EPA Information:
  - [Background on PFAS](#)
  - [Fact sheet](#)
  - [Health Advisory for PFOA and PFOS](#)



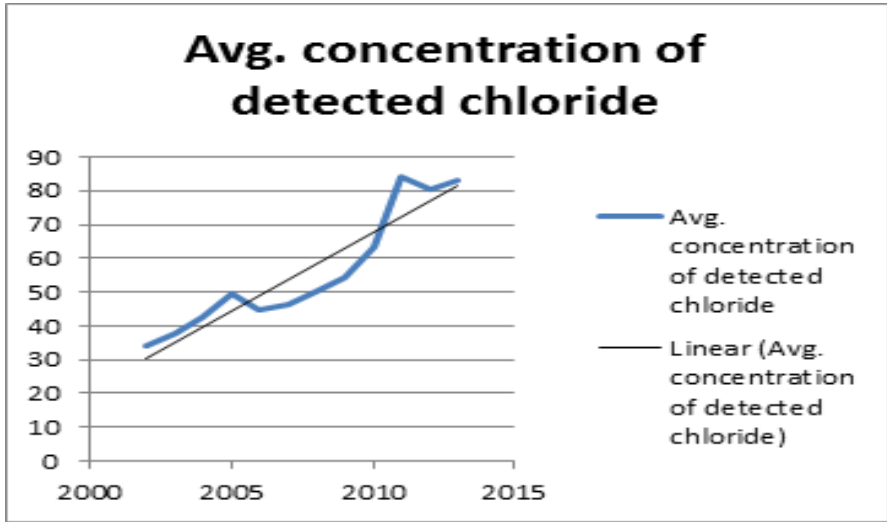
# Chloride Overview

- Most Public Water Systems Test for Chloride



- The purple dots indicate PWSs with elevated chloride levels. The larger the circles, the higher the concentration.

- DWS has seen an overall increase in chloride in drinking water in Connecticut (2001-2018)



# Sources of Chloride in the Environment

- Septic System Failure
- Inappropriate discharge of drinking water treatment wastewater
- Historical/current agricultural uses
- Storm water infiltration/drainage discharges
- Winter roadway/parking lot/sidewalk maintenance practices
- Quarrying and blasting
- Salt Water Intrusion
- Many times it is a combination of two or more of the above

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# New Sources-Changes in DWS Practices

- CGS Section 25-33(b): PWS Source Approval
  - Control of Sanitary Radius must be demonstrated
- More emphasis on potential road salt impacts for public supply source reviews:
  - Protection from surface wash
  - Storm water collection, infiltration and discharges
  - Curbing/parking lots





# Existing Sources-Investigate and Mitigate

- Conduct a Source Water Assessment

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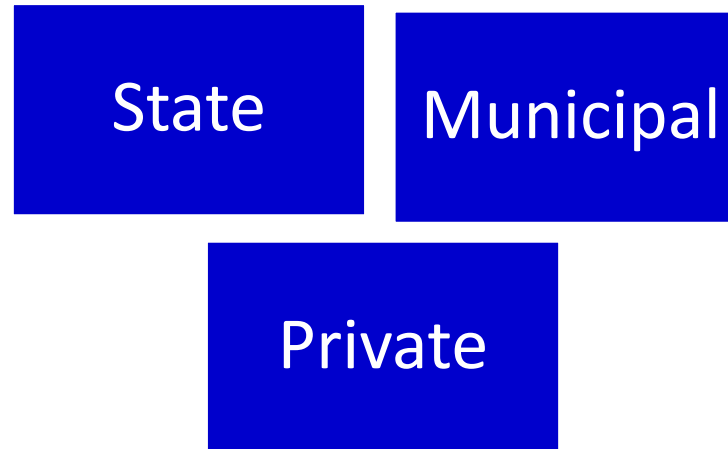
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# Existing Sources-Investigate and Mitigate

- Chloride MCL Exceedance
  - Required BMP development following MCL exceedance for chloride
  - Update violation letter to reflect BMP requirement
- Education/Training



# Drinking Water Section Chloride Policy

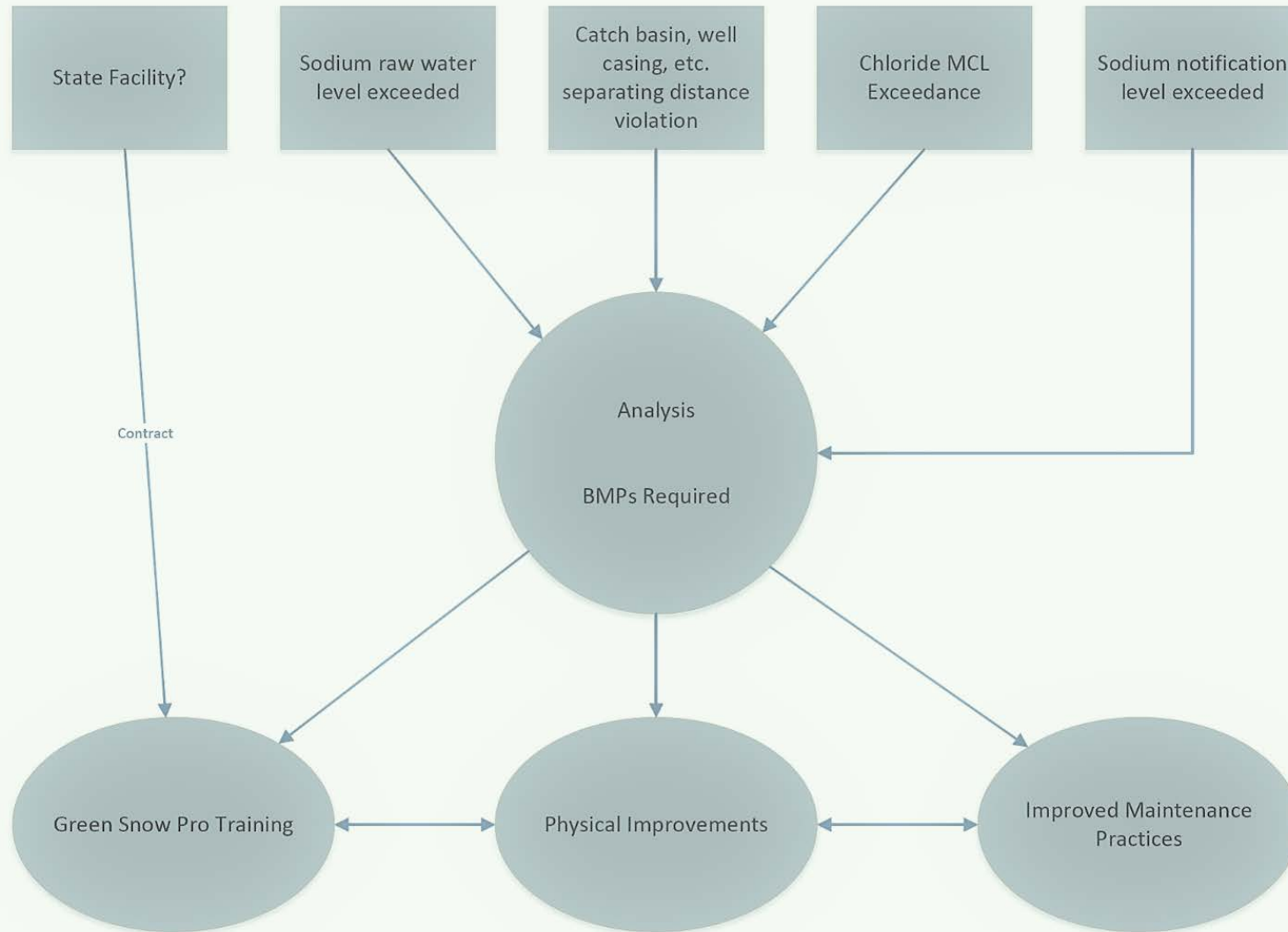
- Multi-faceted, multi-agency effort underway to reduce inputs
- Educating stakeholders and fostering collaboration
- Understand the physical linkage between road salt applications and public supply sources
- Design/maintain/improve infrastructure to lessen the impact of chloride in DW
- Require BMPs in some instances

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### DWS Policy Flow Chart for Addressing Chloride in a Public Water Supply Source



# Chloride Resources

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**Source Water Protection Practices Bulletin**


**Managing Highway Deicing to Prevent Contamination of Drinking Water**

**FACTS:**

- More than \$2 billion is spent each year on winter road maintenance.
- 15 million tons of deicing salt are used each year.
- Abrasives such as sand are often used in conjunction with deicing chemicals to provide traction.
- Chloride is not naturally removed from water as it travels through soil and sediments.
- Individual measures might or might not be adequate to prevent contamination by themselves.
- Better forecasting can prevent excessive application


*We depend on clear roads and highways for safe travel and the uninterrupted flow of goods and services. Deicing chemicals help clear roads covered by snow and ice during the winter, but road runoff may later carry these chemicals to surface water and ground water sources of drinking water. This bulletin focuses on the management of highway deicing chemicals. See the bulletin on stormwater runoff for additional source water management measures.*

*This document is intended to serve as a resource for professionals and citizens involved in planning, decision-making, and providing technical assistance in the areas of stormwater management and source water protection. Those who may find this bulletin useful include: state and regional source water, stormwater, nonpoint source control, Underground Injection Control (UIC), and other managers; water system operators; members or repre-*



*1- Big Red Snow Plow, NJ 2003*

*We depend on clear roads for safe travel and the*



**Connecticut Technology Transfer Center**

**Training and Events**

**Green Snow Pro: Sustainable Winter Operations**

A CT Road Scholar Program *ELECTIVE* Workshop

Sustainability in Winter Operations is more important than ever. With environmental impacts increasing and budgets continuing to decline, towns must employ best practices to minimize salt use and maximize their operations for both fiscal and environmental stewardship. This class focuses on those best practices for salt application and maintenance of public works facilities and

**GREEN SNOWPRO**

**Dates & Locations**

Center, with financial assistance from the Dept. Environmental Services, have completed nun since developing an action plan a decade ago the brook's health. More information >

**UNHSC Develops resources for NH and MA M Compliance**

UNHSC in cooperation with EPA Region 1 staff assembled a series of factsheets that summarize management practices and associated performance developed for the new MA and NH MS4 permit. More information >

**Going the Distance**

The UNHSC and City of Dover collaboration to urban residential watershed was recently highlighted in Land & Water Magazine!

Read the article here: [Going the Distance](#)

**Gravel Wetland at the Greenland Meadows commercial shopping center, Greenland, NH, taken Summer 2009**

**Recent Projects**

**Berry Brook Project**

The Berry Brook project in Dover NH is complete! This partnership between NHDES, UNHSC and the... More >

**Undersized GI System Performance**

This report details results from two years of study of two undersized stormwater control measures... More >



# Questions?

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Pat Bisacky  
Environmental Analyst 3  
Source Assessment and Protection Unit  
Drinking Water Section  
[Patricia.Bisacky@ct.gov](mailto:Patricia.Bisacky@ct.gov)  
860-509-7333



# Revised Total Coliform Rule

- New requirements began April 1, 2016
  - CT Draft Regulations still under review
- Key Changes
  - Eliminates the MCL for total coliforms
  - Establishes an MCL for *E. coli*
  - Establishes Treatment Technique requirements
    - Level 1 and Level 2 Assessments (“Find and Fix”)
  - Defines a “Sanitary Defect”
  - Allowances for increased and reduced monitoring
  - Start-up procedures required for seasonal systems that dewater/depressurize their distribution system

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# Revised Total Coliform Rule

## Level 1 and Level 2 Assessments:

- Required as soon as practical after a Trigger is exceeded
- Level 1 Triggers
  - 5% of samples TC+ if collecting > 40
  - Two or more TC+
  - Failure to collect all repeat samples
  - Can be conducted by PWS personnel or operator
- Level 2 Triggers
  - E. coli MCL violation
  - A 2<sup>nd</sup> Level 1 trigger within a 12-month period if the original problem was not corrected
  - The DWS requires it be conducted by an approved Level 2 Assessor

# Revised Total Coliform Rule Challenges

## 14 E. Coli Positive Distribution MCL Violations in 2017

### Level 1 and Level 2 Assessments:

- Assessment Report due within 30 days after the system learns that it has exceeded a trigger
  - PWS should not wait to be notified by the DWS after results have been submitted.
- The RTCR Rule requires Level 1 and Level 2 Assessment Reports to indicate the actual date that a Sanitary Defect was corrected or a date when it will be corrected
  - Sanitary Defect - A defect that could provide a pathway of entry for microbial contamination into the distribution system or that is indicative of a failure or imminent failure in a barrier that is already in place.
  - Open-ended statements (i.e. the problem will be fixed) are not acceptable
  - The RTCR requires identified Sanitary Defects to be corrected or on a schedule to be corrected upon report submittal
  - More triggers require more investigation (camera inspection, etc)

### Seasonal System Start-up Procedures:

- The RTCR Rule requires start-up procedures to be performed and the *Certification of Seasonal Start-up Procedure* form is required to **be submitted to the Department prior to serving water**

# Revised Total Coliform Rule Compliance

- **Notify and consult with the DWS and notify the LHD as soon as practical but no later than 24 hours after the system learns of the E. coli MCL violation.**
  - Request to speak directly with a member of the DWS staff.
    - **PWS or operators should not leave a voice mail message.**
- PWS may be asked to issue a Boil Water Advisory or perform other interim measures until the PWS returns to compliance
- Correct any sanitary defects identified in a Level 1 or 2 Assessment
- Disinfect the water system after all required triggered and additional ground water source monitoring is conducted
- Collect samples in distribution for Total Coliforms and/or Chlorine Residual
- The PWS would then be able to request the DWS to lift the Boil Water Advisory
- It is recommended that a PWS collect investigatory total coliform samples after each treatment unit and from each storage facility to determine if the source of bacteria is originating from these facilities.



# PWS with Distribution E Coli Positive

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Hole in well casing discovered through a camera inspection



# PWS with Distribution E. Coli Positive

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PWS Connected to  
Sewer, stockpiled old  
septic material  
upgradient of well



# Ground Water Rule Challenges

- **68** positive source E. Coli detections at PWS in 2017
- Each groundwater source of supply must have a dedicated sample tap installed prior to any storage or treatment facility.
- RCOSA 19-13-B102e(12): Triggered and Assessment Source Monitoring for e. coli under GWR
  - A triggered source water sample must be collected from each active source of supply “in use” at the time that each positive routine RTCR sample was collected.
  - 5 confirmation samples for e. coli at the Well must be collected within 24 hours
  - **PWS shouldn't disinfect until its sure that no additional (confirmation) monitoring will be required.**
- Required to conduct PN within 24 hours of each EC+ (**twice** - original and confirmation) unless the PWS has an approved Fecal Indicator Monitoring Plan.
  - PWS with an approved Fecal Indicator Monitoring Plan will be required to conduct PN within 24 hours of the **confirmed** positive e. coli results.
- The GWR requires that corrective action is completed within 120 days

# Ground Water Rule Compliance

Determining where and how the e. coli is entering the well

- Camera Inspection of Well
- Eliminate Well Pits by raising the Well Casing or ensure they are watertight and not subject to flooding
- Make sure the pitless adapter connection is watertight

The system must implement one of the following corrective actions:

- **Look at fixing the problems first with 4-log disinfection as last resort**
- Correct all significant deficiencies;
- Provide an alternate source of water;
- Eliminate the source of contamination; or
- Provide treatment that reliably achieves at least 4-log (99.99 percent) treatment of viruses using inactivation, removal, or a department-approved combination of 4-log virus inactivation and removal before or at the first consumer for the ground water source.



# PWS - Source and Distribution E Coli Positive

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Another defect  
in the well casing  
found through  
camera  
inspection



# PWS - Source and Distribution E. Coli Positive

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Bad distribution sample tap

Not watertight well pit  
that flooded and caused  
source contamination



# Stage 2 Disinfection Byproducts Rule

- Applies to all CWS and NTNC that deliver water treated with a primary disinfectant (not UV)
- Maximum Contaminant Levels have not changed
  - TTHM MCL = 0.080 mg/L
  - HAA5 MCL = 0.060 mg/L
- Compliance with the MCL is based on a Locational Running Annual Average (LRAA) at locations identified in compliance monitoring plans
- An OEL exceedance requires an OEL report to be submitted to the DWS within 90 days of being notified of the result
  - Compare the OEL to MCL

The operational evaluation report includes:

- An examination of system treatment and distribution operational practices, including changes in sources or source water quality, storage tank operations, and excess storage capacity, which may contribute to high TTHM and HAA5 formation.
- Identify what steps could be considered to minimize future OEL exceedences.

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# Stage 2 Disinfection By-Product Challenges

- **3** DBP MCL violations in 2017
- **16** DBP OEL exceedances triggered in 2017
- **87** individual TTHM hits above the MCL in 2017 vs. 50 in 2016
- **32** individual HAA5 hits above the MCL in 2017 vs. 8 in 2016

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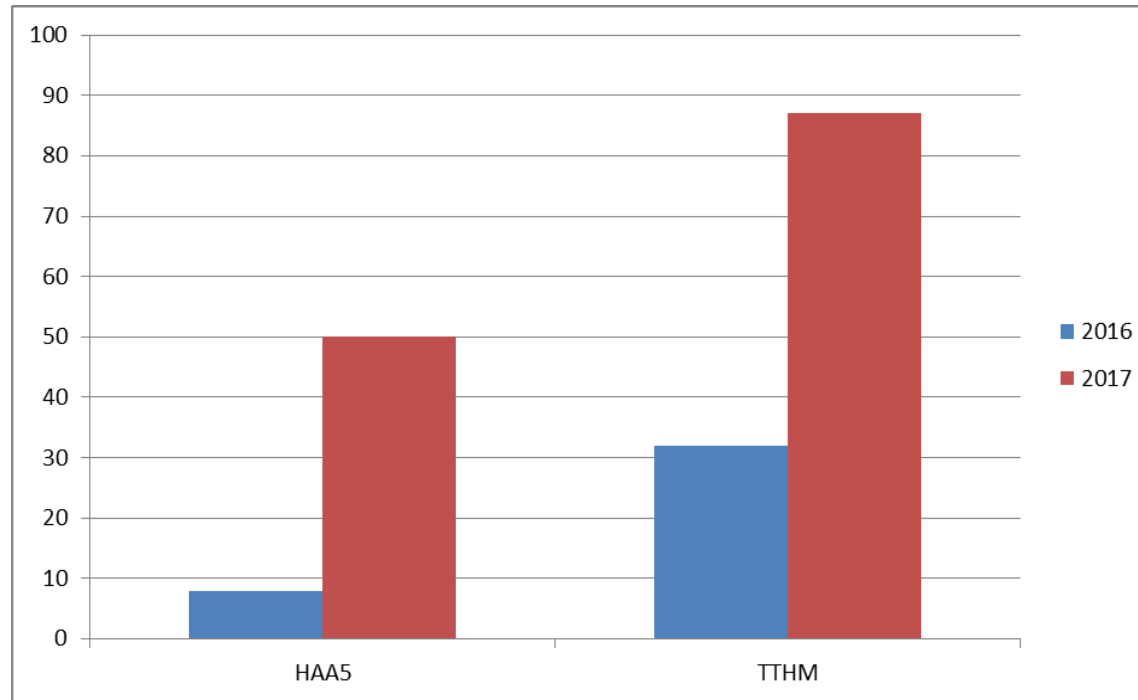
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# 2016 vs. 2017 DBP Results

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- Significant increase in amount of DBP hits from 2016 to 2017 and it is continuing into 2018

# Stage 2 Disinfection By-Product Compliance

- Potential causes and possible solutions:
  - Water Age
    - Distribution Modeling to identify areas of high water age
    - Eliminate dead ends in the distribution system
    - PWS can make sure they have adequate tank turnover/mixing
    - Lower storage tank levels to reduce the amount of stagnant water
  - Source water quality changes
    - Temperature changes
    - More organics
  - Change in treatment strategy
    - Stop prechlorination
    - Optimize coagulation
  - Drought conditions
    - Lowering of reservoir intakes
    - Less distribution system flushing

# Stage 2 Disinfection Byproducts Rule

## Compliance Monitoring Plans

- Required for all systems
- All plans have been reviewed and approved by the DWS
- The Stage 2 DBPR requires plans to be followed exactly as approved:
  - Sampling frequency
  - Sampling locations
  - Sampling date range
- Plans must be re-evaluated when there are significant changes to disinfection treatment or distribution system hydraulics
- Any changes to the plan must include a justification and receive approval from the DWS
- Compliance Monitoring Plan Forms and Instructions are available on the DWS Website

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# Lead and Copper Rule

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## General reminders

- Applicable to all CWS and NTNC PWS
- Lead Action Level = **0.015 mg/L**
- Copper Action Level = **1.3 mg/L**
- Following an exceedance, PWS returns to standard routine tap monitoring (every 6 months)
- Lead Consumer Notice – **The LCR requires this notice for every lead tap water sample collected to persons served at the sites tested**
  - Notice must be delivered as soon as practical but not later than 30 days after learning of the results
  - **DWS expects 24 hour notification if the result is > 0.015 mg/L**



# Lead and Copper Rule – Challenges

## Sampling Locations

- The LCR requires all systems to have an up-to-date pool of sampling locations with Tier and tier type identified
- **All lead and copper samples must be reported to the DWS using the actual sampling point, not a generic distribution site**
- Sample from locations that are in regular use and don't have Point-Of-Use treatment, (e.g. Kitchen sinks, bathroom sinks, water fountains)
- The LCR requires PWS to not sample at a location that is rarely used, utility sinks, or vacant apartments.

## Sampling procedures

- The LCR requires a first draw sample and 1 Liter in sample size
- Automatic faucets are not appropriate sampling locations
- The LCR requires PWS to not collect after an extended period of non-use (after school vacation, etc.)

# Lead and Copper Rule

## DWS Expectations

- **PWSs should be calculating 90<sup>th</sup> percentiles and notifying the DWS of action level exceedances (ALEs)**
- An exceedance of either action level triggers additional requirements:
  - Water Quality Parameter Monitoring
  - Corrosion Control Treatment (CCT) Evaluation and Installation
  - Source Water Monitoring
  - Source Water Treatment Evaluation and Installation
  - Lead Public Education (lead exceedance only)
  - Lead Service Line Monitoring and/or Replacement (repeated lead exceedance only)
  - Copper Public Notification (Tier 2) (CT requirement only)

# Lead and Copper Rule

## New Requirements and Policies

- All lead ALEs require a Tier 1 Public Notification in addition to the existing Lead Education requirement
- When a lead ALE occurs, DWS will issue an administrative order to tighten-up the due dates for the OCCT steps
- After OCCT installation, PWS must monitor for WQPs for two 6-month periods in order to propose optimal water quality control parameters for continued compliance
- Following an ALE and treatment installation, monitoring reductions will only be granted after four satisfactory 6-month rounds of monitoring
- A new LCR monitoring reduction request form is currently under development

# Lead and Copper Rule – Solutions

- Analyze the Water Quality Parameter (WQP) results collected from an exceedance of the lead or copper 90<sup>th</sup> percentile
- Review the Optimal Corrosion Control Treatment (OCCT) guidance manual to determine what is the best solution for your PWS water chemistry (WQPs)
- Note:
  - Installing a Calcite Filter is not always the correct treatment solution based on your PWS water chemistry (WQPs)

# Thanks for Listening! Questions??

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Connecticut Department of Public Health Website:

<http://www.portal.ct.gov/DPH/Drinking-Water/DWS/Drinking-Water-Section>

Presenter Information:

Carissa Madonna

Sanitary Engineer 3

CT Department of Public Health Drinking Water Section

Safe Drinking Water Rule Implementation Unit

410 Capitol Avenue, MS#12DWS

P.O. Box 340308

Hartford, CT 06134-0308

Phone: 860-509-7333

carissa.madonna@ct.gov

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