

# Area Wide Optimization Program



## Individual Program Background Information 2019

**Name of Agency:** Connecticut Department of Public Health – Drinking Water Section

**Official Recognition of AWOP**

Connecticut formally indicated interest in joining AWOP in March 2011 after several plant performance issues including one system that had copepod and rotifer breakthrough. CT hosted kickoff meeting in December 2011 and committed to joining EPA Region 3 AWOP in 2012 (EPA Region 1 currently does not participate in AWOP).

**Official Adoption of AWOP Goals**

To date CT has only informally adopted internal AWOP Goals but has not formally adopted a status component including formal notification to water systems. Connecticut currently implements its AWOP through an enhanced sanitary survey process where optimization goals are discussed with water systems during sanitary surveys.

**National Optimization Goals adopted by your PWSS Program** – Check all that apply:  
(refer to Attachment I for descriptions of the NOLT optimization goals.)

Water Treatment Plants

*Microbial (Turbidity):* Raw Water\_\_\_\_ Individual Settled\_\_\_\_ CFE  IFE   
Post BW w/FTW  Post BW wo/FTW  Disinfection (CT) \_\_\_\_

*DBPs (TTHM/HAA5):* Plant Effluent\_\_\_\_ Enhanced Coagulation\_\_\_\_ Disinfection\_\_\_\_

*Chloramine Application:* Ammonia Control\_\_\_\_ Dosing (Chlorine & Ammonia) \_\_\_\_

Distribution Systems

Individual Site DBPs \_\_\_\_ Long Term System DBPs\_\_\_\_ Tank Operations\_\_\_\_  
Secondary Disinfection, Free Chlorine \_\_\_\_  
Secondary Disinfection, Chloramines (monochloramine, Ammonia & Nitrite) \_\_\_\_

**Modifications to the national goals or other optimization goals utilized by your Agency:**  
N/A

## **Description of *Current* AWOP Team Members and Responsibilities**

Please provide the name, position/title, description of AWOP duties and approximate FTE that each team member spends on AWOP. Also indicate who serves as the AWOP team lead/point of contact.

*Example: Nevel O. Meter, District Engineer, PBT trainer, ~ 0.3 FTE*

*(Note that if you submitted this information in 2017, that information is being provided and if there are no changes, simply indicate “no change” in this section.)*

1. AWOP Team Co-Leader: Tom Chyra, P.E. – Supervising Sanitary Engineer
2. Co-Leader: Mandy Smith – Supervising Sanitary Engineer
3. Austin McMann – Sanitary Engineer 2, sanitary surveys and project reviews
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- 5.
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- 8.
- 9.
- 10.

## **Description of *Former* AWOP Team Members:**

Please provide the name of former AWOP team members, and their reason for leaving the team. This information is for historical purposes and also to support networking as AWOP continues to expand.

*(Note that if you submitted this information in 2017, that information is being provided and if there are no changes, simply indicate “no change” in this section.)*

1. No change
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
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- 10.

<b>Inventory of State-Wide Treatment Facilities<sup>1</sup></b>	<b>Number</b>
Rapid rate filtration treatment plants <sup>2,3</sup>	47
Utilizing static settling without tubes or plates	18
Utilizing static settling with tubes or plates	9
Utilizing sludge blanket clarification (upflow, pulsator)	4
Utilizing contact adsorption clarification	4
Utilizing sludge recirculation (including ballasted clarification)	
Utilizing DAF, or other alternative clarification process	9
Utilizing direct/in-line filtration	3
Utilizing packaged filtration (package plants)	7
Slow sand filter plants	1
Diatomaceous earth filter plants	
Membrane treatment plants	1
Bag or cartridge filtration plants	
Primary disinfectant	
Free chlorine	46
Chloramines	
Ozone	3
UV	
Secondary disinfectant	
Free chlorine	
Chloramines	
<sup>1</sup> Limited to surface water treatment plants (includes surface, GUDI, blended sources). <sup>2</sup> All surface water treatment plants, except cartridge, membrane and slow sand. <sup>3</sup> When a plant utilizes multiple treatment processes or configurations identified below, please include them all in this inventory, e.g., a package plant that utilizes a CAC will be included as a rapid rate plant using CAC and packaged filtration.	

### **AWOP Vision:**

Please describe the vision for your AWOP

- Continue to implement AWOP through our enhanced sanitary survey process with ultimate goal of formally implementing status component
- Have systems start submitting electronic MORs with CFE turbidity data by end of 2019 so that we can then use to populate OAS, long term goal to get IFE turbidity data as well
- Incorporate AWOP into other areas such as DBPs and OCCT approvals

### **Status Component Implementation:**

Please describe status component activities that are implemented in your agency, e.g., (are water systems ranked according to public health risk and how is this information used; how is water system data integrity ensured):

Due to staffing and resource issues, CT has not been able to formally implement a status component at this time. Instead we implement through an enhanced sanitary survey process with existing staff.

**Targeted Performance Improvement (TPI) Implementation:**

Please list all activities that are implemented as TPI activities in your state, e.g., CPEs, PBT, Enhanced Sanitary Surveys, technical assistance, other): Enhanced sanitary surveys of surface water systems with an emphasis on data integrity and optimization. More than a dozen systems have been identified during sanitary surveys that had SCADA data capping issues. For new plant approvals increased focus is given on meeting optimization goals and preventing data integrity issues such as SCADA data capping. Worked with one utility to pilot ETSW at their plant. Currently expanding enhanced sanitary surveys to also focus on DBP optimization goals.

**AWOP Maintenance Component Implementation:**

*Integrate*

Please check the following areas where AWOP has been integrated into the PWSS Program:  
Plan Reviews  Permitting  Capacity Development \_\_\_\_\_ Operator Training \_\_\_\_\_  
Technical Assistance \_\_\_\_\_ DWSRF Prioritization  Enforcement \_\_\_\_\_ Sanitary Surveys   
Other(identify)\_\_\_\_\_

*Enhance*

Please describe any AWOP enhancements that have been implemented in your program. One example could include modifying status component criteria

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*Sustain*

Please describe any activities that you implement to sustain your agency’s AWOP. Some examples could include efforts to promote and incentivize AWOP (e.g., publish regular newsletter, awards program, AWOP participation = higher ranking for grant/loan funding, etc.).

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**Lessons Learned:**

Please list “lessons learned” that you feel would be helpful to other programs, e.g., how to build and maintain internal support, how to integrate AWOP into your PWSS program, etc). If you are new to AWOP, please list a question or concern you’d like to know more about.

Buy in and support from management is critical. Small steps in AWOP development are better than no steps. Work at a pace that suits your individual program.

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## Attachment I: Optimization Goals Adopted by the NOLT

Category	Goal	Applies to	Description
Microbial	Minimum Data Monitoring Goal Raw Water Turbidity	Rapid Rate Filtration Plants	— Record maximum daily raw water turbidity.
Microbial	Individual Sedimentation Basin Performance and Monitoring Goals	Rapid Rate Filtration Plants	<p>— Settled water turbidity <math>\leq 2</math> NTU in 95% of readings when the annual average raw turbidity is <math>&gt; 10</math> NTU. Optimization is based on the daily maximum values recorded from all readings.</p> <p>— Settled water turbidity <math>\leq 1</math> NTU in 95% of readings when the annual average raw turbidity is <math>\leq 10</math> NTU. Optimization is based on the daily maximum values recorded from all readings.</p> <p>— Record individual sedimentation basin effluent turbidity readings at intervals of 4-hours or less if taking grab samples, or 15 minutes or less for continuous monitoring.</p>
Microbial	Individual and Combined Filter Performance and Monitoring Goals	Rapid Rate Filtration Plants	<p>— Combined filter effluent turbidity <math>\leq 0.10</math> NTU in 95% of readings. Optimization is based on the daily maximum values recorded from all readings.</p> <p>— Individual filter effluent turbidity <math>\leq 0.10</math> NTU in 95% of readings (excluding 15-minute period following filter backwash). Optimization is based on the daily maximum values recorded from all readings.</p> <p>—Post backwash individual filter effluent turbidity for filters <u>without</u> filter-to-waste capability: Maximum individual filter effluent turbidity following backwash <math>\leq 0.30</math> NTU and achieve <math>\leq 0.10</math> NTU within 15 minutes.</p> <p>—Post backwash individual filter effluent turbidity for filters <u>with</u> filter-to-waste capability: Minimize individual filter effluent turbidity during filter-to-waste period and record maximum value. Return the filter to service at <math>\leq 0.10</math> NTU.</p> <p>— Record individual and combined filter effluent turbidity readings at intervals of 1-minute or less for continuous monitoring.</p>
Microbial	Disinfection Performance and Monitoring Goals	Rapid Rate Filtration Plants	<p>—Meet CT requirements to achieve inactivation of <i>Giardia</i> and viruses plus a system-specific factor of safety.</p> <p>— Record disinfectant residual, temperature, and pH at maximum daily flow for CT calculations.</p>
Disinfection By-Product	Plant Effluent Disinfection Byproducts (DBPs) Performance and Monitoring Goals	Surface Water and Groundwater Under the Direct Influence of Surface Water Plants	<p>—System Specific Targets: Could be a discrete value or range that is based on a running annual average. Recommended goal value/range should be 30% to 50% of long term LRAA goals (e.g., 20-30 ppb for TTHM, 15-20 ppb for HAA5).</p> <p>—For systems in compliance with the TTHM and HAA5 MCLs, collect quarterly plant effluent DBP samples; for systems not in compliance, collect monthly plant effluent samples.</p>
Disinfection By-Product	Enhanced Coagulation Performance and Monitoring Goals	Surface Water and Groundwater Under the Direct Influence of Surface Water Plants	<p>—Meet Stage 1 D/DBP Rule TOC removal requirements for enhanced coagulation, which are based on source water alkalinity and TOC levels, or an alternative compliance criterion, as a running annual average (RAA) of the performance ratio (actual TOC removal/required TOC removal) plus a factor of safety of 10% (or performance ratio <math>\geq 1.1</math>).</p> <p>—Collect monthly total organic carbon samples for raw and treated water.</p>
Disinfection By-Product	Disinfection Performance and Monitoring Goal	Surface Water and Groundwater Under the Direct Influence of Surface Water Plants	<p>—Meet CT requirements to achieve inactivation of <i>Giardia</i> and viruses plus a system-specific factor of safety.</p> <p>—Record disinfection residual, temperature, and pH at maximum daily flow for CT calculations (only applies to parent systems).</p>

<i>Distribution System</i>	Disinfection Byproducts Performance and Monitoring Goals	Parent and Consecutive Water Systems that Utilize any Secondary Disinfectant	<p>—Individual Site Goal: Quarterly Maximum Locational Running Annual Average TTHM/HAA5 values not to exceed 70/50 ppb.</p> <p>—Long-Term System Goal: Average of Maximum Locational Running Annual Average TTHM/HAA5 values not to exceed 60/40 ppb (the average of the last 8 quarters cannot exceed 60/40 ppb).</p> <p>—For systems in compliance with the TTHM and HAA5 MCLs, collect quarterly DBP samples at all compliance locations; for systems not in compliance, collect monthly samples.</p>
<i>Free Chlorine Distribution System</i>	Disinfection Performance and Monitoring Goals	Parent and Consecutive Water Systems that Utilize Free Chlorine as a Secondary Disinfectant	<p>—Maintain <math>\geq 0.20</math> mg/L free chlorine residual at all monitoring sites in the distribution system, at all times.</p> <p>—Monitoring should be performed at least monthly, but more frequently at critical times (i.e., summer months).</p> <p>—Sample locations should include bacteriological and DBP compliance sites, all distribution system entry points (e.g., plant effluent, consecutive system connections), all tanks (preferably while draining), and identified critical sites base on investigative sampling (minimum of one critical site in each quadrant of the system, four sites total).</p>
<i>Plants that Utilize Chloramine</i>	Disinfection: Ammonia Control Performance and Monitoring Goals	Parent and Consecutive Water Systems that Utilize Chloramine as a Secondary Disinfectant	<p>—Maintain a detectable free ammonia residual in the plant effluent <math>\leq 0.10</math> mg/L as <math>\text{NH}_3\text{-N}</math>.</p> <p>—Monitor free ammonia at <u>least</u> once per day in the plant effluent.</p> <ul style="list-style-type: none"> <li>• The monitoring frequency may be adjusted based on the variability observed over an extended period of time.</li> <li>• Free ammonia may be monitored in the source water periodically (e.g., once per week) to assess variability.</li> </ul>
<i>Plants that Utilize Chloramine</i>	Operational Guideline Chlorine and Ammonia Dosing	Parent and Consecutive Water Systems that Utilize Chloramine as a Secondary Disinfectant	<p>—Maintain a chlorine-to-nitrogen mass ratio between 4.5:1 and 5.0:1 (or chlorine-to-ammonia mass ratio between 3.7:1 and 4.1:1), which should result in a detectable free ammonia in the plant effluent that is <math>\leq 0.10</math> mg/L as <math>\text{NH}_3\text{-N}</math>.</p>
<i>Chloramine Distribution System</i>	Disinfection: Monochloramine and Nitrification-Related Parameters Performance and Monitoring Goals	Parent and Consecutive Water Systems that Utilize Chloramine as a Secondary Disinfectant	<p>—Maintain <math>\geq 1.50</math> mg/L monochloramine residual at all monitoring sites in the distribution system, at all times, to provide a disinfection barrier against both microbial contamination and nitrification prevention.</p> <p>—Monitor monochloramine, free ammonia, and nitrite in the distribution system and at the entry points (to establish a baseline).</p> <ul style="list-style-type: none"> <li>• Monochloramine and free ammonia should be monitored at <u>all sample locations</u>.</li> <li>• Nitrite should be monitored at sample locations where monochloramine is <math>\leq 1.50</math> mg/L; nitrate may also be monitored, to further assess nitrification.</li> <li>• Sample locations should include bacteriological and DBP compliance sites, all distribution system entry points (e.g., plant effluent, consecutive system connections), all tanks (preferably while draining), and identified critical sites base on investigative sampling (minimum of one critical site in each quadrant of the system, four sites total).</li> <li>• Monitoring should be done at least monthly, but more frequently at critical times (e.g., summer months).</li> </ul>
<i>Distribution System</i>	Operational Guidelines Tank Operations	Parent and Consecutive Water Systems that Contain Storage Tanks (any secondary disinfectant)	<p>—Maintain an average turnover time <math>&lt; 5</math> days; or establish and maintain a water turnover rate at each storage facility.</p> <p>—Maintain good mixing (i.e., Performance Ratio <math>\geq 1</math>) at all times; for tanks where the PR cannot be calculated, adequate mixing (i.e., uniform water quality) should be confirmed by alternate means (e.g., tank profiling/water quality sampling).</p>