Area Wide Optimization Program

Individual Program Background Information 2019

Name of Agency: Washington State Dept of Health-Office of Drinking Water

Official Recognition of AWOP

Please provide the AWOP start date and describe any official recognition of AWOP in agency newsletters, web pages, awards programs, annual meetings, etc.

Start date: 2001.
Presentation at 2017 AWWA Pacific NW Section conference: Washington's Tracer Study Project

H2Ops Newsletter (September 2017, p. 8): High 5-Lakehaven Water and Sewer District. "A big High 5 to Lakehaven Water and Sewer District for hosting our annual Area Wide Optimization Program (AWOP) workshop on distribution system optimization…."
https://www.doh.wa.gov/Portals/1/Documents/4200/H2Ops-9-2017.pdf

Official Adoption of AWOP Goals

Please describe when and how AWOP goals were adopted by your agency and communicated to the water systems.

Goals were adopted in 2003. A letter and laminated poster containing the goals was sent to every rapid rate filter plant.

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_X_ CFE_X_ IFE__X_
Post BW w/FTW_X_ Post BW wo/FTW_X_ Disinfection (CT) _X__

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:
Please describe any modified AWOP goals and/or any additional optimization goals adopted by your agency and communicated to the water systems.

We track and use CFE because that is what is reported by our systems on their MORs

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: Nancy Feagin: Program oversight and reporting, data collection, management and evaluation, Coordination of regional and HQ staff, data integrity activities and training, represents WA in Region 10 AWOP
2. AWOP Team Co-Leader: Stephen Baker: Technical Assistance, Training (including PBT), Contract management for CPE's, represents WA in Region 10 AWOP
3. Regional Engineers/ Surface Water Specialists:
    a. Russsell Mau, Eastern Regional Office
    b. Teresa Walker, Southwest Regional Office
    c. Jolyn Leslie, Northwest Regional Office

    Technical assistance, data integrity, participate in CPEs and PBTs
4. Nathan Ikehara, technical assistance & data integrity
5. Steve Deem, Regional engineer: turbidity & disinfection data integrity projects
6. Jeff Johnson and Nick Fitzgerald, Regional engineers: participate in field activities
7. Other regional engineers: technical assistance, data integrity, participate in CPEs and PBTs

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

Inventory of State-Wide Treatment Facilities[1]	**Number**
Rapid rate filtration treatment plants[2,3]	57
Utilizing static settling without tubes or plates	7
Utilizing static settling with tubes or plates	16
Utilizing sludge blanket clarification (upflow, pulsator)	0
Utilizing contact adsorption clarification	19
Utilizing sludge recirculation (including ballasted clarification)	2
Utilizing DAF, or other alternative clarification process	2
Utilizing direct/in-line filtration	
Utilizing packaged filtration (package plants)	35
Slow sand filter plants	19
Diatomaceous earth filter plants	5
Membrane treatment plants	14

Bag or cartridge filtration plants	34
Primary disinfectant	
Free chlorine	132
Chloramines	0
Ozone	4
UV	5
Secondary disinfectant	
Free chlorine	
Chloramines	1

[1]Limited to surface water treatment plants (includes surface, GUDI, blended sources).
[2]All surface water treatment plants, except cartridge, membrane and slow sand.
[3]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

To protect public health and reduce the risk of waterborne disease by assuring that surface water treatment facilities are properly designed, constructed, staffed, operated, and maintained

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):

We use maximum daily CFE data to rank systems into three groups:

Category 1 – meet optimization goals. 95th % CFE ≤ 0.10 NTU and Max CFE ≤ 0.30 NTU
Category 2 – 95th % CFE ≤ 0.20 NTU and Max CFE = 0.31 - 0.80 NTU or 95th % CFE = 0.11 - 0.20 NTU and Max CFE ≤ 0.80 NTU
Category 3 - Category 3 - 95th % CFE > 0.20 NTU or Max CFE > 0.80 NTU

Category 1 plants are considered for our recognition program
Category 2 plants are targeted for technical assistance and training, including PBT and CPEs
Category 3 plants are targeted for compliance action – these often have violations.

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): _____

- CPE
- PBT
- CTA
- Training
- Sanitary Survey
- Recognition (Awards) Program

AWOP Maintenance Component Implementation:

Integrate

Please check the following areas where AWOP has been integrated into the PWSS Program:
Plan Reviews_X__ Permitting_____ Capacity Development_____ Operator Training_X__
Technical Assistance_X__ DWSRF Prioritization_____ Enforcement_____ Sanitary Surveys_X_
Other(identify)_____

Enhance

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

- Distributed slow sand filtration optimization guidelines
- Drafted DE filtration optimization guidelines
- Incorporated data integrity elements, such as instrument calibration/verification into MORs

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.).

- Awards program,
- regular presentations to internal staff and management,
- regular articles in WaterTap and H2Ops newsletters,
- presentations at local conferences and training.

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.

The most effective strategy for Category 2 (nearly optimized) systems is to help them achieve optimized performance using training and technical assistance. The most effective strategy for Category 3 (bottom-performing) systems is restructuring or replacement of rapid rate filtration with a different type of source (groundwater or purchased) or a different technology such as membrane or slow sand filtration.

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	— Settled water turbidity ≤ 2 NTU in 95% of readings when the annual average raw turbidity is > 10 NTU. Optimization is based on the daily maximum values recorded from all readings. — Settled water turbidity ≤ 1 NTU in 95% of readings when the annual average raw turbidity is ≤ 10 NTU. Optimization is based on the daily maximum values recorded from all readings. — 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.
Microbial	Individual and Combined Filter Performance and Monitoring Goals	Rapid Rate Filtration Plants	— Combined filter effluent turbidity ≤ 0.10 NTU in 95% of readings. Optimization is based on the daily maximum values recorded from all readings. — Individual filter effluent turbidity ≤ 0.10 NTU in 95% of readings (excluding 15-minute period following filter backwash). Optimization is based on the daily maximum values recorded from all readings. —Post backwash individual filter effluent turbidity for filters <u>without</u> filter-to-waste capability: Maximum individual filter effluent turbidity following backwash ≤ 0.30 NTU and achieve ≤ 0.10 NTU within 15 minutes. —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 ≤ 0.10 NTU. — Record individual and combined filter effluent turbidity readings at intervals of 1-minute or less for continuous monitoring.
Microbial	Disinfection Performance and Monitoring Goals	Rapid Rate Filtration Plants	—Meet CT requirements to achieve inactivation of *Giardia* and viruses plus a system-specific factor of safety. — Record disinfectant residual, temperature, and pH at maximum daily flow for CT calculations.
Disinfection By-Product	Plant Effluent Disinfection Byproducts (DBPs) Performance and Monitoring Goals	Surface Water and Groundwater Under the Direct Influence of Surface Water Plants	—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). —Collect quarterly TTHM and HAA5 samples at the plant effluent and distribution system compliance sites.
Disinfection By-Product	Enhanced Coagulation Performance and Monitoring Goals	Surface Water and Groundwater Under the Direct Influence of Surface Water Plants	—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 ≥ 1.1). —Collect monthly total organic carbon samples for raw and treated water (only applies to parent systems).
Disinfection By-Product	Disinfection Performance and Monitoring Goal	Surface Water and Groundwater Under the Direct Influence of Surface Water Plants	—Meet CT requirements to achieve inactivation of *Giardia* and viruses plus a system-specific factor of safety. —Record disinfection residual, temperature, and pH at maximum daily flow for CT calculations (only applies to parent systems).

Distribution System	Disinfection Byproducts Performance and Monitoring Goals	Parent and Consecutive Water Systems that Utilize any Secondary Disinfectant	—Individual Site Goal: Quarterly Maximum Locational Running Annual Average TTHM/HAA5 values not to exceed 70/50 ppb. —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). —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.
Free Chlorine Distribution System	Disinfection Performance and Monitoring Goals	Parent and Consecutive Water Systems that Utilize Free Chlorine as a Secondary Disinfectant	—Maintain ≥ 0.20 mg/L free chlorine residual at all monitoring sites in the distribution system, at all times. —Monitoring should be performed at least monthly, but more frequently at critical times (i.e., summer months). —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).
Plants that Utilize Chloramine	Disinfection: Ammonia Control Performance and Monitoring Goals	Parent and Consecutive Water Systems that Utilize Chloramine as a Secondary Disinfectant	—Maintain a detectable free ammonia residual in the plant effluent ≤ 0.10 mg/L as NH3-N. —Monitor free ammonia at <u>least</u> once per day in the plant effluent. • The monitoring frequency may be adjusted based on the variability observed over an extended period of time. • Free ammonia may be monitored in the source water periodically (e.g., once per week) to assess variability.
Plants that Utilize Chloramine	Operational Guideline Chlorine and Ammonia Dosing	Parent and Consecutive Water Systems that Utilize Chloramine as a Secondary Disinfectant	—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 ≤ 0.10 mg/L as NH3-N.
Chloramine Distribution System	Disinfection: Monochloramine and Nitrification-Related Parameters Performance and Monitoring Goals	Parent and Consecutive Water Systems that Utilize Chloramine as a Secondary Disinfectant	—Maintain ≥ 1.50 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. —Monitor monochloramine, free ammonia, and nitrite in the distribution system and at the entry points (to establish a baseline). • Monochloramine and free ammonia should be monitored at <u>all sample locations</u>. • Nitrite should be monitored at sample locations where monochloramine is ≤ 1.50 mg/L; nitrate may also be monitored, to further assess nitrification. • 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). • Monitoring should be done at least monthly, but more frequently at critical times (e.g., summer months).
Distribution System	Operational Guidelines Tank Operations	Parent and Consecutive Water Systems that Contain Storage Tanks (any secondary disinfectant)	—Maintain an average turnover time < 5 days; or establish and maintain a water turnover rate at each storage facility. —Maintain good mixing (i.e., Performance Ratio ≥ 1) 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).