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# R10/8 Area-Wide Optimization Program Remote Meeting February 11-12, 2020

## Oregon AWOP Update

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**Drinking Water Services**



OFFICE OF ENVIRONMENTAL PUBLIC HEALTH  
Drinking Water Services

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# Oregon 2020 AWOP Work Plan

Activities	Details	Activity Lead
<b>Identify applicable goals</b>	Optimization goals are available for conventional, direct, slow sand, and membrane filtration. Goals are available for disinfection, DBPs, arsenic, etc. 0.1 NTU – CF/DF, 1 NTU – SSF, 0.05 NTU – MF, 0.2 mg/l dist CL2, Avg LRAA for TTHM/HAA5 $\leq$ 60/40 and LRAA TTHM/HAA5 $\leq$ 70/50 ppb.	All
<b>Identify applicable water systems</b>	List of systems depends upon optimization goals and available data to determine if objectives are met.	All
<b>Direct mail</b>	Send targeted mailing to determine what goals systems have adopted and how.	EH
<b>HFLR</b>	High Filter Loading Rate – Finish evaluations and determine resolution <b>Updated survey forms to better capture data</b>	JN
<b>Offer training classes</b>	Conduct: <ul style="list-style-type: none"> <li>• 1 Slow Sand Filtration</li> <li>• 1 Conventional/Direct Filtration</li> <li>• 1 Essentials of Surface Water Treatment</li> <li>• Explore options for on-line training</li> </ul>	EH
<b>Conduct PBT or CPE</b>	Conduct 1 PBT or CPE at a system with the highest 95 <sup>th</sup> percentile turbidity. Coquille in March 2020.	RT
<b>R10 Host Mtg</b>	May 2020 – HABS workshop – Detroit/Salem/Joint Water Commission	JN
<b>Conduct 5 “Strike Team” Visits</b>	“Strike Team” visits are to be conducted on systems with the highest 95 <sup>th</sup> percentile turbidity and could include: <ul style="list-style-type: none"> <li>• Data integrity audits,</li> <li>• Filter evaluations,</li> <li>• OAS data set-up,</li> <li>• Other activities depending upon the needs of the needs of the plant</li> </ul>	RT
<b>Outreach</b>	Conference presentations <ul style="list-style-type: none"> <li>• 1 CCtoC short school and 1 OAWU – presentations – Oregon and WA efforts Optimization ppt that James developed for Albany (April 2019), ETSW – 2 presentations at each – JMacpherson</li> <li>• Clackamas Waterworks School (EHofeld – Who’s Optimized and Membrane Optimization)</li> <li>• Direct mailing of goals to ~ 110 conventional and direct filtration plants</li> <li>• Maintain website</li> </ul>	JN
<b>Promote/Facilitate Place-Based Planning</b>	Participate in place-based planning effort for a community water system (Mid-Coast Partners – a coalition of PWSs and other agencies/entities in Lincoln County) and encourage formal adoption of optimization goals/concepts. Involves participation in partner and sub-committee meetings and provide document review. Similar effort is underway in Harney County, John Day area and at least 1 other area in NE Oregon – this ties into Capacity Development.	JM
<b>SRF efforts –</b>	Continue implementation of small system equipment assistance through SRF Loan program. We could follow-up with loan recipients regarding establishing optimization goals and setting up process controls to meet the goals (e.g. recommend alarm set-points to ensure they meet the goals). <b>implementation on hold due to resource limitations</b>	DL
<b>Track objectives</b>	Use the data provided for the National Turbidity Graph to illustrate progress. Develop additional queries needed to determine compliance with other goals.	EH

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# Water System Survey Improvements

*Turbidity Alarm Set-Points*

*High Filter Loading Rates*

*Membrane Filtration LRV ambient*

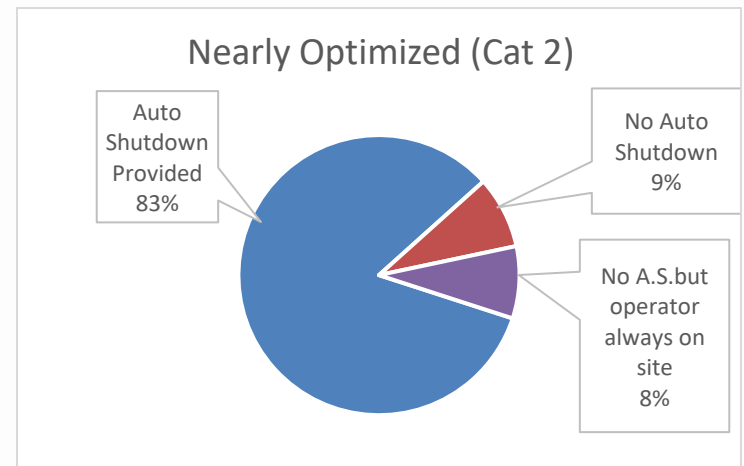
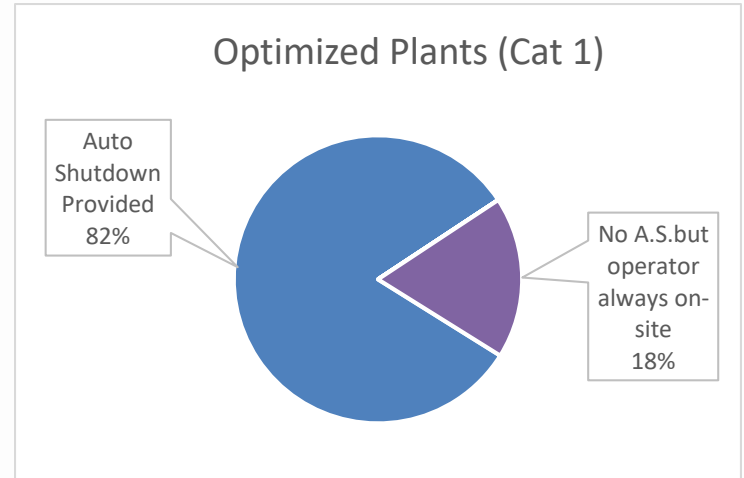
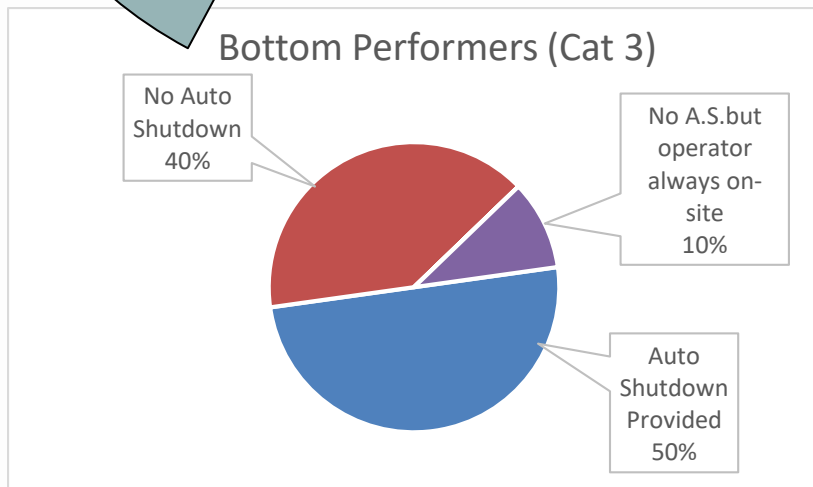
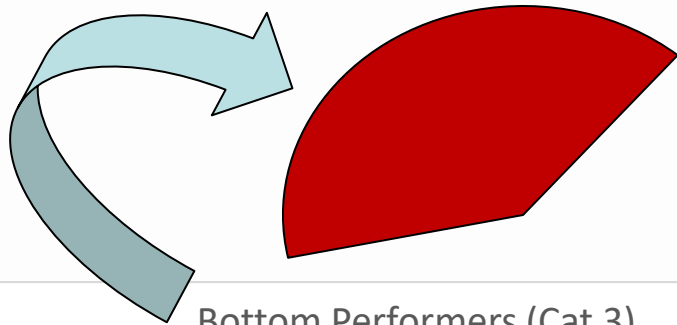


Announced to Oregon Staff on February 4, 2020 at DWS Technical Services Unit Meeting

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# What did we learn from Washington's efforts?

40% of Bottom Performers had no auto-shutdown set point for high turbidity



Category 1 - 95th % CFE  $\leq$  0.10 NTU and Max CFE  $\leq$  0.30 NTU

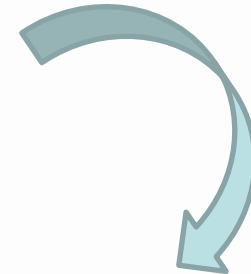
Category 2 - 95th % CFE  $\leq$  0.20 NTU and Max CFE = 0.31 - 0.80 NTU or 95th % CFE = 0.11 - 0.20 NTU and Max CFE  $\leq$  0.80 NTU

Category 3 - 95th % CFE  $>$  0.20 NTU or Max CFE  $>$  0.80 NTU

# Survey forms updated...

- Document High NTU Alarm Set-Points
- Opportunity to discuss optimization goals
- High turbidity shut-down alarms required in OAR 333-061-0076 when plant operates unstaffed.

Are operators on site during all hours of plant operation?  
  ● If no, is there an alarm for low chlorine and high turbidity? (> 3300 pop. for chlorine)  
 Low chlorine    High turbidity    Plant shutdown    Auto dial



Are operators on site during all hours of plant operation?  5 pts  
  ● If no, is there an alarm for low chlorine and high turbidity? (> 3300 pop. for chlorine)

Alarm	Auto-dial at what #?	Plant shutdown at what #?	Verified? (yes/no)
High turbidity	<input type="checkbox"/> NTU	<input type="checkbox"/> NTU	
Low chlorine	<input type="checkbox"/> mg/L	<input type="checkbox"/> mg/L	

Total Points =

AWOP fact sheet provided to operator?

**Comments:**

water plant - Full Control

UF 1 Setup / Limits

Overview UF Skid 1 Controls CIP Trends

**SHUTDOWN**

Alarms Alm Reset

### Alarm Setpoints

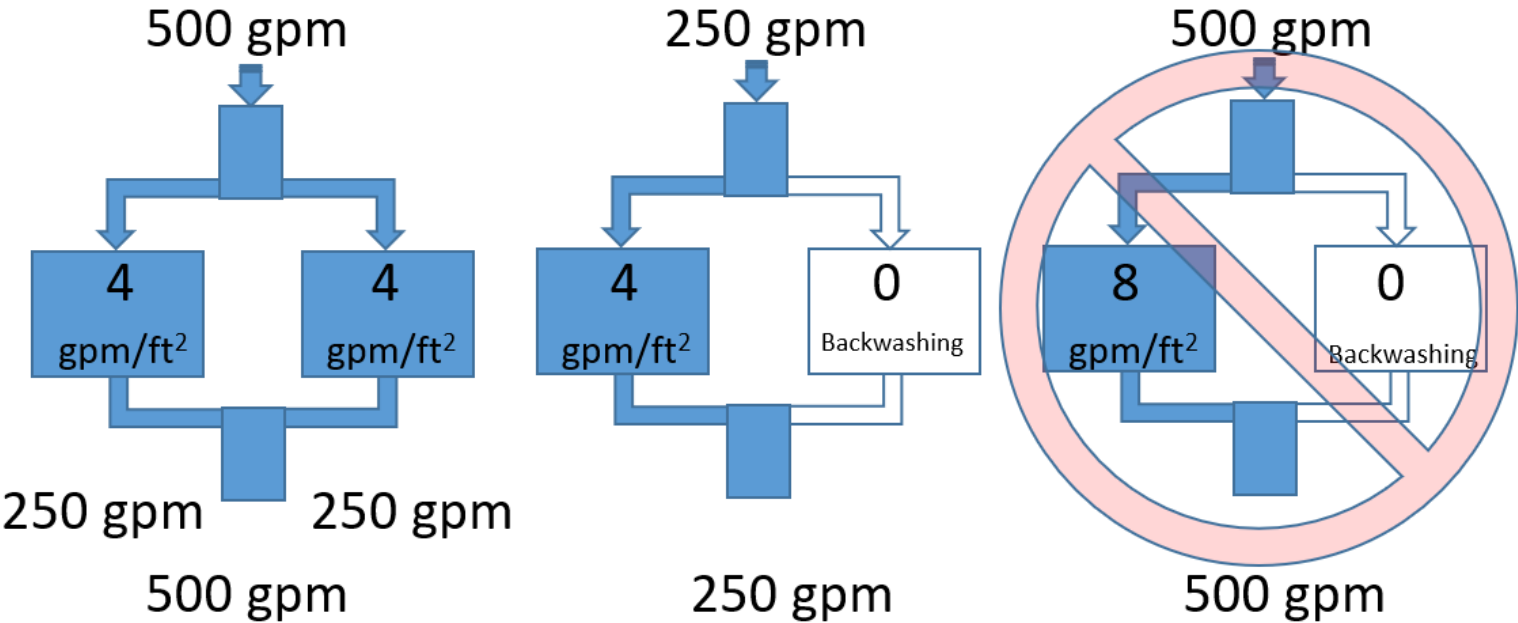
Alarm Description	Lo-Lo Limit	Low Limit	High Limit	Hi - Hi Limit
refilter Inlet Pressure PI-100		2.0 psi	50.0 psi	
refilter Differential Pressure			6.0 psi	7.0 psi
membrane Inlet Pressure PI-110		2.0 psi	40.0 psi	
permeate Pressure PI-120		2.0 psi	35.0 psi	
permeate Turbidity AI-121			0.1 NTU	0.2 NTU
permeate pH AI-122		6.0 pH	8.0 pH	
permeate Temperature TI-120				40.0 C
CIP Tank Level LI-140	5.0 %	10.0 %	85.0 %	95.0 %
Raw Water Tank LI-100	10.0 %	20.0 %	90.0 %	97.0 %
BackWash Tank LI-130	5.0 %	24.0 %	90.0 %	97.0 %
Flow Alarm Limits (Not Adjustable)		24.0 %	36.0 %	

### STEP TIMERS

Production	Value
Production Interval	30 min
Pre-Start Air Purge/Refill	45 sec
Backwash	Value
	45 sec
	30 sec
	20 sec
Draw	60 sec
Pre-Filter Flush	
Scheduled Flush Setpoint	6.0 psi
Immediate Flush Setpoint	7.0 psi
Target Flush Pressure	40.0 psi
Flush Time	40 sec
Max Pump Flush Speed	90 %

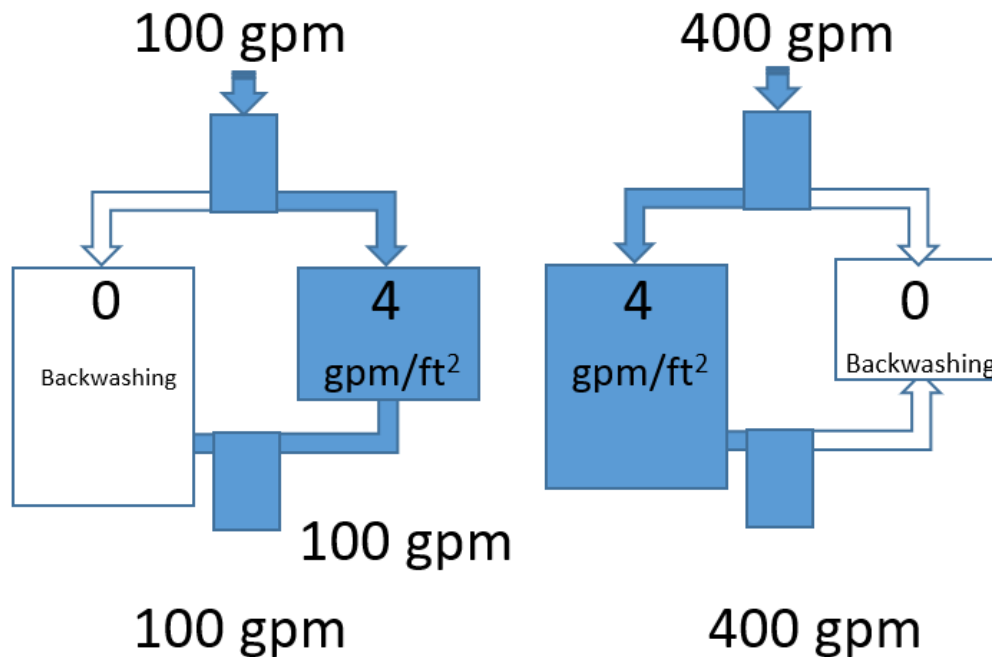
WesTech membrane plant (Arch Cape)

# High Filter Loading Rate



Don't overload like this! 

# High Filter Loading Rate – Now What!



Filters are different sizes, but FLR should be the same!



# Survey forms updated...

- Survey forms updated to document FLR when one filter is taken off-line for backwashing
- Use comments to describe filter loading rates when filters are different sizes.

Peak instantaneous op. flow last year (gpm):  Comments: \_\_\_\_\_

Filter Area (total) (ft<sup>2</sup>):

Filter Loading Rate (gpm/ft<sup>2</sup>):

Log removal credit given  
Giardia:  Crypto:

What was the peak instantaneous operating flowrate at time of treatment plant evaluation (gpm):

Based on:  CPE  Plan review  WTP evaluation/rating form Date:

Peak inst op flow last year & w 1 filter in backwash-gpm  &  Comments:

Filter Area (total & with one filter in backwash) ..... (ft<sup>2</sup>):  &

Filter Loading Rate (total & with 1 in backwash) (gpm/ft<sup>2</sup>)  &  If either of these loading rates are > 4 (6 for deep beds), see AWOP team.

Log removal credit given  
Giardia:  Crypto:

What was the peak instantaneous operating flowrate at time of treatment plant evaluation (gpm):

Based on:  CPE  Plan review  WTP evaluation/rating form Date:

**Comments:**

# LRV<sub>ambient</sub> for membrane filtration

- LRV<sub>ambient</sub> now required (eff. 1/1/20) for all membranes
  - Existing installations will take time to get programming done
- Updating survey forms to capture data

Challenge Test Info	LT2ESWTR compliant challenge tested modules in use? <input type="checkbox"/> Yes <input type="checkbox"/> No <i>Note: Check list of verified models and refer to plan review coordinator if non-LT2 compliant modules are in use.</i>							
	Indicate the following: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Max allowed TMP [psi]: <input type="text"/></td> <td style="width: 50%;">LRC [log]: <input type="text"/></td> </tr> <tr> <td>Max allowed flux [gfd]: <input type="text"/></td> <td>Min LRV<sub>ambient</sub>: <input type="text"/></td> </tr> <tr> <td>Minimum DIT test pressure [psi]: <input type="text"/></td> <td>Max LRV verifiable by DIT (LRV<sub>DIT</sub>): <input type="text"/></td> </tr> <tr> <td>Allowed DIT decay rate [psi/min]: <input type="text"/></td> <td>← Upper Control Limit (UCL) assigned under PR# <input type="text"/></td> </tr> </table>	Max allowed TMP [psi]: <input type="text"/>	LRC [log]: <input type="text"/>	Max allowed flux [gfd]: <input type="text"/>	Min LRV <sub>ambient</sub> : <input type="text"/>	Minimum DIT test pressure [psi]: <input type="text"/>	Max LRV verifiable by DIT (LRV <sub>DIT</sub> ): <input type="text"/>	Allowed DIT decay rate [psi/min]: <input type="text"/>
Max allowed TMP [psi]: <input type="text"/>	LRC [log]: <input type="text"/>							
Max allowed flux [gfd]: <input type="text"/>	Min LRV <sub>ambient</sub> : <input type="text"/>							
Minimum DIT test pressure [psi]: <input type="text"/>	Max LRV verifiable by DIT (LRV <sub>DIT</sub> ): <input type="text"/>							
Allowed DIT decay rate [psi/min]: <input type="text"/>	← Upper Control Limit (UCL) assigned under PR# <input type="text"/>							

Latest DIT Results	When was the most recent passing DIT (refer to SCADA and record DIT results for 1 rack/skid/unit)? Date: <input type="text"/>
	Latest DIT results for the following membrane unit (indicate rack/skid/unit ID# or name) <input type="text"/> <ul style="list-style-type: none"> <li>✓ Beginning DIT test pressure? <input type="text"/> psi</li> <li>✓ Ending DIT test pressure? <input type="text"/> psi Ending pressure ≥ minimum required pressure? <input type="checkbox"/> Y <input type="checkbox"/> N• <input type="checkbox"/> Unknown</li> <li>✓ Duration of DIT = <input type="text"/> minutes (2-5 minutes is typical)</li> <li>✓ Pressure decay rate (PDR) = <input type="text"/> psi/min <span style="float: right;">PDR ≤ UCL? <input type="checkbox"/> Y <input type="checkbox"/> N• <input type="checkbox"/> Unknown</span></li> </ul> <p style="font-size: small; margin-left: 20px;"><i>PDR = (start pressure - end pressure)/duration of DIT</i></p> <ul style="list-style-type: none"> <li>✓ Ambient LRV (LRV<sub>ambient</sub>) = <input type="text"/> log <input type="checkbox"/> N/A <span style="float: right;">LRV<sub>ambient</sub> ≥ LRC? <input type="checkbox"/> Y <input type="checkbox"/> N• <input type="checkbox"/> Unknown</span></li> <li>✓ DIT sensitivity (LRV<sub>DIT</sub>) = <input type="text"/> log <input type="checkbox"/> N/A <span style="float: right;">LRV<sub>DIT</sub> ≥ LRC? <input type="checkbox"/> Y <input type="checkbox"/> N• <input type="checkbox"/> Unknown</span></li> </ul> When were pressure sensors (used in determining the decay rate) last verified or calibrated? <input type="text"/> (recommend annually and per manufacturer's instructions)
	Comments: <input type="text"/>

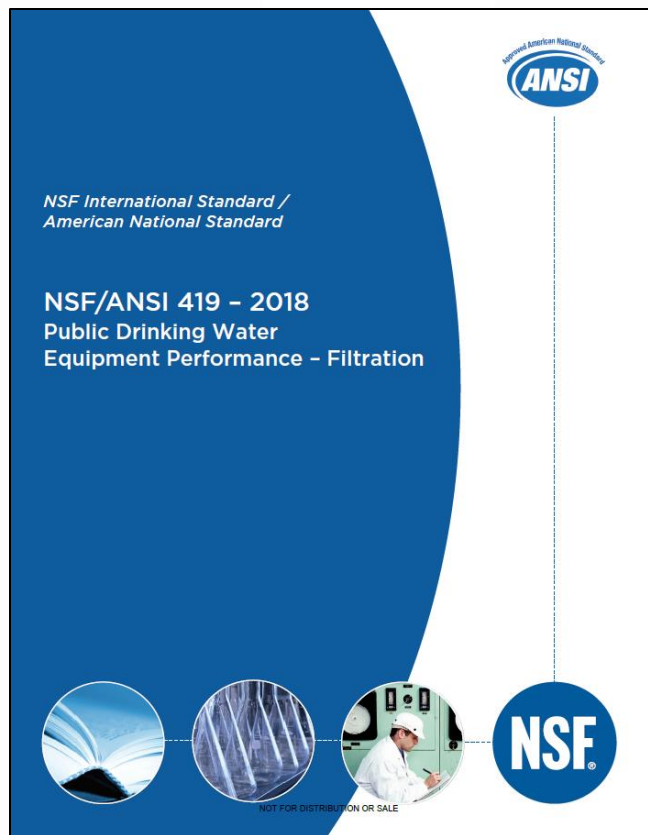
# NSF 419 - 2018 ...Currently under review!

(last rev. March 2019, © 2019)

## Challenge Testing for Membranes (incl. cartridge filters)

**UPDATED**

- Annex C – Data tables & LRV equations for modules tested



- Annex F – Information on calculating LRV
- Annex G – Information on plan review and commissioning

# Questions?

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The screenshot displays the Oregon Health Authority website's 'Surface Water Treatment' page. The header includes the Oregon Health Authority logo and navigation links. The main content area is titled 'Optimization, Training and Other Resources' and features a sidebar with a navigation menu. The 'Surface Water Treatment Resources' section contains several boxes: 'What is Optimization?' with a list of topics; 'Current Optimization Goals' with a link to 'Conventional & Direct Filtration'; 'Learn More About...' with a list of processes; 'What's New?' with a link to 'Subscribe to the AWOP News'; 'Forms, Tools & Resources' with a list of resources; 'Free Training Resources' with a list of training materials; and 'Key Links' with links to 'Drinking Water Data Online', 'Site Map', and 'For Consumers'.

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Oregon Health Authority Surface Water Treatment Oregon Drinking Water Services

Public Health Division Environmental Public Health Drinking Water Water System Operations Surface Water Treatment

### Optimization, Training and Other Resources

- Drinking Water Services
- Water System Operations
- Surface Water Treatment**
- Capacity Development
- Public Notice Resources & Templates
- Fact Sheets & Best Management Practices
- Water System Surveys & Outstanding Performance
- Circuit Rider Program
- Pipeline Newsletter
- Contact Us

### Surface Water Treatment Resources

The information on this page is intended for operators and owners of water systems that treat a surface water source.

#### What is Optimization?

- Background & Introduction
- Water Treatment Optimization
- Area Wide Optimization (AWOP)

#### Current Optimization Goals

- Conventional & Direct Filtration

#### Learn More About...

- Coagulation
- Flocculation
- Sedimentation/Clarification
- Filtration
- Disinfection

#### What's New?

- Subscribe to the AWOP News

#### Forms, Tools & Resources

- Forms & Tools
  - Technical, Managerial & Financial Resources
  - Algae Resources
  - More Training Opportunities
  - Employment Opportunities and Equipment

#### Free Training Resources

- Essentials of Surface Water Treatment
- Slow Sand Filtration
- Conventional and Direct Filtration
- Performance Based Training

#### Key Links

- Drinking Water Data Online
- Site Map
- For Consumers

[www.healthoregon.org/swt](http://www.healthoregon.org/swt)

Water System Operations => Surface Water Treatment