

USE OF ALTERNATE WATER SOURCES FOR COOLING TOWERS



Services of the San Francisco Public Utilities Commission

PREPARED BY TRUSSELL TECHNOLOGIES – SEPTEMBER 2024

Beyond toilet flushing and irrigation, alternate water sources can also be used in cooling towers in commercial and multi-family residential buildings. This fact sheet highlights special considerations for this end use.

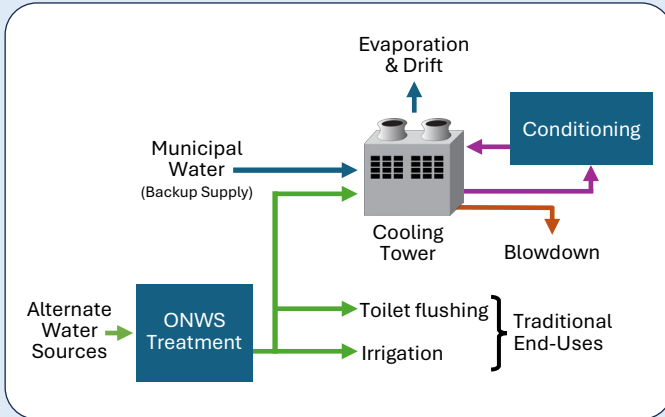
- Cooling towers require conditioning of the recirculating water.** Switching from potable water to an alternate source water will change the water quality and may require modification of the existing cooling tower conditioning. Cooling tower operations should be evaluated and modified based on changes in organics, ammonia, hardness, TSS, chloride, and TDS.
- Pathogen reduction requirements depend on the selected alternate source water.** This fact sheet shows example ONWS treatment trains that meet the required pathogen reduction in Article 12C (also known as the Non-potable Water Ordinance). All systems must maintain a free chlorine residual after treatment.
- Other alternate water sources may be considered for cooling towers, but their suitability is strongly dependent on their water quality and the tolerance of the cooling tower materials.** For example, condensate from cooling coils or steam boilers have a relatively low TDS, while RO concentrate derived from treating municipal drinking water can have higher TDS and may require additional conditioning for sensitive materials.

CONSIDERATIONS FOR APPROVED ALTERNATE WATER SOURCES

	WATER QUALITY			Example ONWS Treatment Train
	Organic Matter	Suspended Solids	Pathogens	
 BLACKWATER				MBR OR Membrane Filtration
 GRAYWATER				UV Free Chlorine
 ROOF RUNOFF				Cartridge Filter UV
 STORMWATER/ FOUNDATION DRAINAGE				MBR UV Free Chlorine

MAKE A PLAN

A Water Management Plan should describe actions to mitigate the occurrence of scaling, corrosion, and biofilm formation in the cooling towers. The Plan should also describe strategies to prevent the growth of *Legionella*.



A successful cooling tower management plan should include:

- ◆ Automated blowdown control
- ◆ Water conditioning and regular monitoring
- ◆ Routine system maintenance

The growth of *Legionella* and other opportunistic pathogens is very important to manage within the cooling tower. Measures of *Legionella* control are summarized below.

COOLING TOWER CONTROL MEASURES FOR *LEGIONELLA*

(Adapted from CDC's *Legionella* Control Toolkit)

Water Parameter	Control Measure	Recommendations
Disinfectant Residual	Control limits	<ul style="list-style-type: none"> • Maintain pH based on disinfectant type and manufacturer recommendations to prevent corrosion. • For oxidizing disinfectants (e.g., chlorine & bromine), maintain measurable residuals throughout each day. • For non-oxidizing disinfectants, maintain residuals based on product label concentration and contact time.
Temperature	Control limits	<ul style="list-style-type: none"> • Operate at the lowest possible water temperature, and below the favorable growth range for <i>Legionella</i> (77-113°F, 25-45°C).
Biofilm and Sediment	Cleaning frequency, scale and corrosion inhibitors	<ul style="list-style-type: none"> • Remove cooling towers from service, clean, and disinfect at least annually. • Monitor scale and corrosion inhibitor levels frequently and modify dose based on water quality measurements. • Cleaning frequency varies based on operational factors.
Water Age	Feed water quality and turnover frequency	<ul style="list-style-type: none"> • Flush low-flow pipe runs and dead legs weekly. • Maintain water treatment program during shutdowns less than 5 days. Circulate water 3x's a week through the cooling system. • Ensure system water quality is managed through automated system blowdown. • Use potable water for system makeup water or ensure alternate sources are appropriately managed.