



BROUGHT TO YOU BY YOUR LOCAL WATER PROVIDERS

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Water & Sewer District

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Water & Sewer District

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Coal Creek Utility District

Highline Water District

King County Water District No. 20

King County Water District No. 45

King County Water District No. 49

King County Water District No. 85

King County Water District No. 90

King County Water District No. 119

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Lake Forest Park Water District

Northshore Utility District

Olympic View
Water & Sewer District

Seattle Public Utilities

Shoreline Water District

Soos Creek
Water & Sewer District

Woodinville Water District

Improve Control of Cooling Tower Water *Save Money and Avoid Failures*

Efficient control of cooling tower water provides quick opportunities for office buildings, manufacturing plants, schools, universities, and hospitals to save money and avoid costly repairs. Poorly controlled water quality can result in undue expenses in the form of equipment failure and high chemical, labor and water costs.

Cost-Effective Solutions

- **Install automatic controls.** Controllers that automatically monitor the concentration of dissolved solids and pH and then bleed water or add chemicals as appropriate can contribute to savings in chemical and water usage, reduce the labor requirements associated with manual control and cleaning, and help avoid premature equipment failure.
- **Track water usage.** Install submeters for both makeup and blowdown water and log usage regularly. If usage becomes excessive, check operation of blowdown controller and makeup (float) valve.
- **Regularly test water quality and log results.** Use a hand-held conductivity meter to track conductivity of sump water and log at least monthly. For most cooling towers using Seattle supplied water, conductivity readings between 500 and 750 microsiemens is considered relatively efficient. Lower settings waste water and may also increase corrosion potential. You may also wish to track pH.
- **Set targets.** Work with a reputable water treatment provider to identify your particular requirements and to maximize water efficiency. Set target conductivity levels and obtain a commitment from your service provider to help maintain those levels.
- Consider using **sidestream filtration or ozonation.** For larger cooling towers, sidestream filtration or ozonation of sump water can lower the requirements for chemical treatment and may also reduce the necessary rate of “blowdown.”
- **Improve energy efficiency** in your operations. Energy efficiency measures generally decrease the load on your cooling tower and will also reduce water lost through evaporation.

**WE’LL PAY YOU TO
MAKE THE CHANGE!**
Call (206) 684-5883 to
receive a rebate of up to
50% on any cost-effective
project to eliminate
single-pass cooling.

How Much will it Cost?

Purchase and installation costs to automate your cooling tower will vary according to the number and types of sensors and readouts desired (in addition to conductivity, these controllers can also be used to control the addition of various chemical and biological control agents). However, it is estimated that for many systems, complete purchase and installation may cost around \$1,500. The payback period may be as low as six months or greater than five years. **See the back of this sheet for more information on potential savings.**

SAVING WATER PARTNERSHIP

How Much can You Save?

Savings potential from installation of automatic controls ranges from \$1,000 to over \$15,000 per year, with payback periods well under one year (especially after a water utility rebate). The amount you save will depend on the amount of water used by your system, how efficient your current operation is (cycles of concentration), and your projected water and sewer rates.

Conductivity controllers are the most efficient means of controlling water used in the bleed/feed cycles and can reduce costs in many areas. Labor costs for cleaning and manually adjusting chemical feed rates are reduced. Energy consumption is lowered by minimizing scale buildup on the heat exchanger surfaces (scale acts as an insulator, thereby reducing the efficiency of the unit). The consumption of both chemicals and water is reduced by avoiding excessive bleeding.

Current Cycles Concentration	Evaporation (gpm)	Bleed (gpm)	Total (gpm)	Potential Savings (% of total use)
1.5	7.0	14.0	21.0	64%
2.0	7.0	7.0	14.0	45%
3.0	7.0	3.5	10.5	28%
4.0	7.0	2.3	9.3	18%
5.0	7.0	1.8	8.8	13%
6.0	7.0	1.4	8.4	9%
8.0	7.0	1.0	8.0	5%
10.0	7.0	0.8	7.8	2%
12.0	7.0	0.6	7.6	0%

Table Legend:

Cycles = conductivity of cooling tower water / conductivity of tap water

Evaporation = cooling tower tons x 0.023 or compressor tons x 0.03

Bleed = evaporation / cycles-1

Total = evaporation + bleed

Potential Savings = $(1 - (T / T-1) \times (C-1 / C)) \times 100$, with T=target cycles and C=current cycles

The relative water efficiency of a cooling tower is commonly measured by computing the cycles of concentration. To measure cycles of concentration, divide the conductivity of sump water by the conductivity of the entering tap water. Given the fact that water in the Seattle area is quite pure, cycles of concentration between 8 and 12 are acceptable (higher cycles are more water efficient). At cycles of concentration below 5, water use begins to increase dramatically. The following table illustrates the relationship between cycles of concentration and water consumption for a 300-ton cooling tower serving 230 tons of 12 EER compressor load.

Cooling Tower success story: *Virginia Mason*

Virginia Mason Hospital installed upgrades to their cooling tower control systems. Before making these upgrades, Virginia Mason operated its two cooling towers on a mostly manual basis. This caused, by their own admission, excessive blowdown and overflow episodes, chemical waste, and less than optimal fluctuations in their cycles of concentration.

The upgraded system includes external floats that were added to reduce failures to the sump level control causing excessive sump overflows. Conductivity controllers have been added to even out the flow of chemicals, and finally, a proprietary NALCO Chemical Company control system monitors and controls all of the water chemistry parameters.

Financial Incentives & Technical Assistance for Making Changes

The Water Smart Technology Program provides free technical assistance and rebates to improve your cooling tower performance:

1. You must be a customer of a participating water provider listed on the front of this sheet.
2. Call (206) 684-5883 to receive a program application or free technical assistance.
3. Complete the program application and receive a rebate authorization letter from program staff.
4. Install cooling tower improvements.
5. Receive a rebate of up to 50 percent for any cost-effective upgrade that improves efficiency of your cooling tower.