UNITED
LABORATORIES

What you don't see is costing you money!

From small systems to large, United is committed to greening your cooling tower program.

Clean and green your cooling tower system with the Cycle Smart approach.

Utilizing a combination of Earth Smart® certified products and safer biocides guarantees results:

- Safety for Users and Environment
- Increased Efficiency
- Higher Cycles of Concentration
- Energy Savings
- Water Conservation
- Extended Equipment Life

w.a.t.e.r.
Water savings. Accuracy. Technology. Energy. Responsible innovations

$ These results all add up to money saved. $
You are UNITED with savings!

What You Don't See is Costing You Money

Cycle Smart gives your system a clean start and keeps it clean.

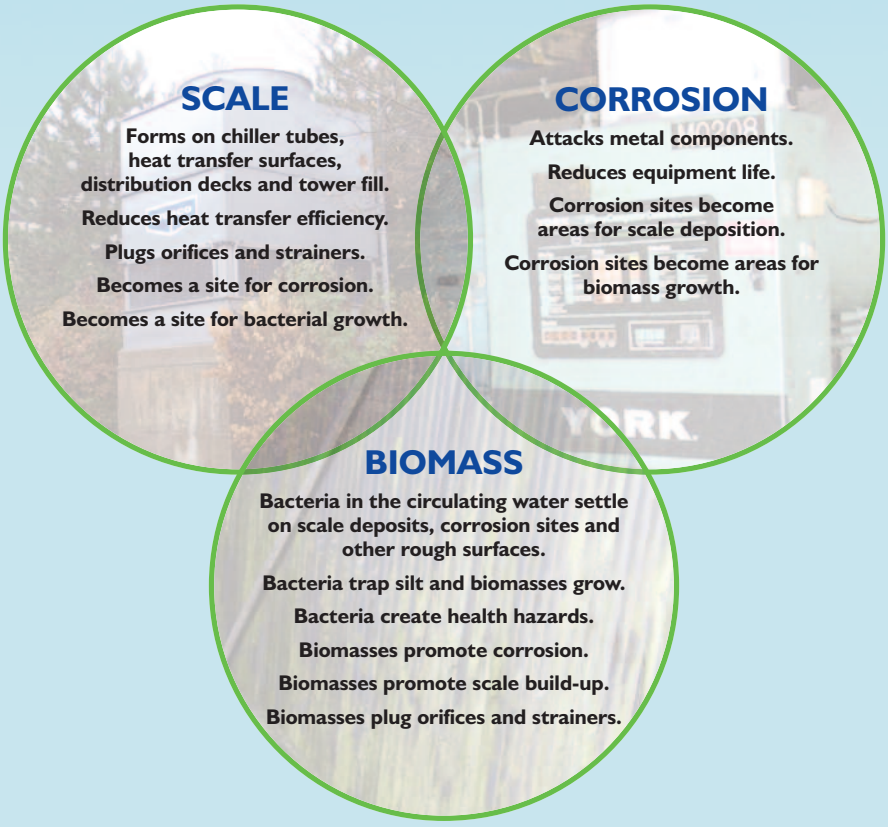
Three items are largely responsible for robbing your cooling tower system of efficiency: scale, biomass and corrosion. What isn't always understood is that they work together and must be treated together through a comprehensive program.

What is biomass?

In terms of cooling towers, biomass is comprised of the bacterial and algal build-up that grows within the system. As it grows in the system it combines with silt, mud and other debris, creating an often hard to manage problem. Biomass is the matrix upon which scale formation takes place. If the biomass is not controlled, descaling products alone may not prevent scale deposition. And, while you can use corrosion inhibitors in a system, you may still get corrosion developing beneath the scale and biomass where the inhibitors alone can't reach.

Because of the relationship between these three issues, it is important to keep your system running cleanly at all times to maximize its efficiency. These problems take hold and start robbing your system of efficiency before you can even see that they exist.

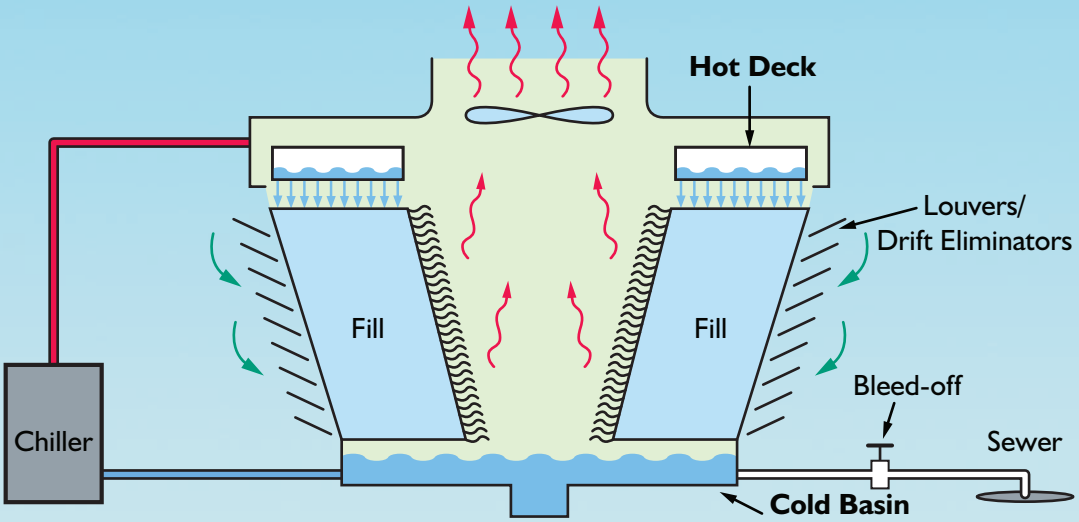
Cycle Smart Provides a Comprehensive Approach to Controlling…



Cycle Smart provides a complete solution to keep your cooling towers clean, green and cooling efficiently, thus saving cost on several levels – energy, water, labor and repairs.

Where to Look When You Can't See the Problem

While many problems in your system will be visible, there are ways to test for loss of efficiency when you can't see those problems. Your United sales representative can walk you through all the problem areas highlighted on the insert page.



Typical Tower/Chiller Schematic

Efficiency loss can easily be reviewed by a couple of means:

1. Measuring the Delta T: The Delta T is the difference between the hot water temperature as it enters the Hot Deck and the water temperature in the Cold Basin. The Delta T is determined by the tower design and geographical location. Loss of Delta T usually indicates some type of deposition and a loss of efficiency.

2. Cycles of Concentration: The higher the cycles of concentration, the more efficient your system is operating. Increasing your cycles will reduce water consumption, waste water generation, chemical treatment requirements and lower overall operating costs.

3. Head Pressure and Scale Thickness: You may not be able to see scale build-up in your chiller, but it can greatly affect your energy costs. You can monitor for scale build-up by measuring head pressure. But waiting for the head pressure to change is not the best method. Just 1/32" of scale can cost you money and it won't be readable through head pressure. See the impact shown in the chart, as reported by the U.S. Department of Energy.

Scale Thickness (inches)	Increased Energy Consumption (%)
1/32	8.5
1/16	12.4
1/8	25
1/4	40.0

Implementing a regular Cycle Smart program will improve efficiencies in these areas, while reducing your costs and greening your water treatment program.

The Cycle Smart Approach

1. System Survey

Our team will determine the overall condition of your cooling water system through a combination of on-site testing and laboratory analysis for water analysis that cannot be completed on-site.

- Physical inspections
- Performance data
- System chemistry
- Other diagnostic tools

2. Get a Clean Start with Cycle Smart

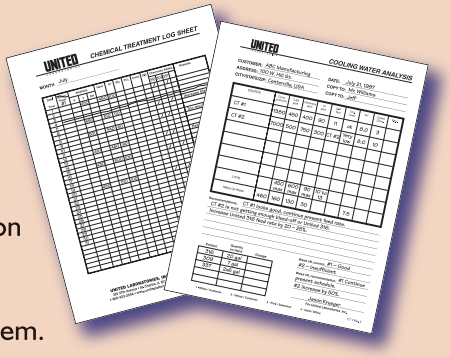
Based on your systems specific needs, we will recommend a program that will remove scale deposits and biomasses, including:

- Online or off-line cleaning
- Earth Smart® acid for severe scale removal
- Online removal of smaller scale deposits
- Bio-penetrants
- Bio-dispersants

3. System Maintenance – Keeping it Clean and Green

Once the cooling system has been thoroughly cleaned, United's Cycle Smart program really kicks in. Regular maintenance programs will keep your system running green, clean and cooling efficiently by utilizing United's Cycle Smart products:

- Earth Smart® scale and corrosion inhibitor will withstand up to one thousand mg/liter of hardness. We will optimize dissolved solids based on system design, water chemistry and environmental factors.
- Optimizing dissolved solids minimizes water usage, reducing both water and sewer bills.
- Cycle Smart biocides are fast acting keeping the system sanitized.
- Cycle Smart biocides rapidly degrade, meeting AWWA standards for biodegradability.
- Cycle Smart biocides penetrate biomasses and prevent bio-fouling.
- Periodic bio-dispersant applications ensure system cleanliness.
- Clean heat transfer surfaces reduce energy costs.
- Smart tower controllers maintain cycles of concentration and chemical dosages.
- Side-stream filtration removes silt from the system.
- Easy test kits allow you to keep your system within program parameters.
- Our trained representatives can service and monitor your systems performance, providing test logs for ongoing documentation to assure you are receiving the best program for your system.



Are you ready to start saving?

You're UNITED with savings.

Ask your United representative to show you how you can begin saving with our Cooling Tower Cost Calculator.

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Cycle Smart Products for Cooling Towers

Give your cooling tower system a clean start with Cycle Smart. Then keep it clean to maximize operating efficiencies, save money and extend your equipment life cycle as well.

The Cycle Smart program utilizes a combination of Earth Smart® certified products and safer biocides that will keep your systems running clean and green, while saving energy and conserving water usage.

United 308 Earth Smart® Closed Loop Treatment

This product is formulated with a blend of organic-based corrosion control compounds for both ferrous and non-ferrous metal systems to help prevent corrosion and extend the life of your system. In addition, it contains polymeric dispersants to prevent scale build-up and iron oxide dispersants that control corrosion that develops under deposits. A borax buffer helps to maintain long term pH control. Contains no nitrites or ortho/polyphosphates. Contains no phosphate, chromate, molybdate or other heavy metals. Completely compatible with glycol charged systems.

United 313 Earth Smart® Cooling Tower Biodispersant

United 313 is engineered with a blend of organic penetrants and dispersal agents that work to penetrate the matrix of organic deposits, causing them to slough off and be dispersed through the system. This keeps the system surfaces free of deposits and corrosion. **United 313** is particularly effective in cleaning the deposits that algal bacterial biofilms create and which often result in areas of localized corrosion that are not readily accessible to other corrosion inhibitors.

United 314 Earth Smart® Cooling Tower Concentrate

Earth Smart® Closed Loop Concentrate is designed to maintain clean heat transfer surfaces and extend the life of cooling system components by protecting them against scale, corrosion and silt deposits. This product is low in toxicity and non-polluting and can be used in cooling towers, evaporative condensers, shell and tube heat exchangers, air washers and diesel engine cooling systems.

United 336 Cycle Smart BIOCIDE

Cycle Smart BIOCIDE is a high performance fast acting, broad spectrum biocide that offers superior activity, particularly in comparison to cationic ammonium and phosphonium biocides. Use this product to control algae, slime forming bacteria, sulfate reducing bacteria and fungi in air washers, cooling towers and evaporative coolers. Possesses excellent surface cleaning properties for cleaning fouled heat exchangers and breaking through the biomass. Rapidly degrades in system, meeting AWWA standards for biodegradability.

United 339 Cycle Smart Stabilized Bromine Treatment

Cycle Smart Stabilized Bromine Treatment provides effective, fast acting control against the algae, bacteria and fungi that produce slime in recirculating condensing and cooling equipment. Keeps the system sanitized while penetrating through the biomasses and preventing bio-fouling. Rapidly degrades in system, meeting AWWA standards for biodegradability.

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Cooling Tower Problems, Effects and Solutions

	Tower (Media)	Chiller	Cold Basin	Hot Deck or Spray Bar System	Wastewater
Problems	Fouling in media from: Scale Mud Biologicals Debris Broken or damaged media Lack of proper air flow, caused by facades that are too close, other physical blockages or incorrect fan speed.	GPM flow rate does not match the specifications of the tonnage of the chiller. Fouling from mud, biologicals or scaling. Strainers plugged.	Raised water level - media in water. Accumlation of mud and debris. Biological growth Corrosion Make-up problems. Float valve not functioning properly.	Scale, biologicals and corrosion. Debris Water distribution	Too high of a bleed off. Too low of a bleed off. Environmental concerns for biological program.
Effects	Scale, mud, biologicals and debris all impede distribution of water flow. Improper water flow causes changes in evaporation and Delta T, decreasing efficiency. Broken or damaged media can also impede water flow and reduce efficiency. When air flow is blocked in some manner, it limits the air volume or proper distribution of air through the media, changing water flow, evaporation, Delta T and limiting efficiency.	Low flow rates may mimic fouling of tubes. Lower flow rates may generate higher Delta T but may decrease the heat rejection by volume. Fouling causes poor heat transference and high approach temperatures, reducing energy efficiency. Plugged strainers lower flow rates and reduce efficiency.	Loss of performance caused by reduction of total media surface above water level. Decrease of water volume; increased TDS (total dissolved solids) and turbidity. Fouling, biomass and MIC (microbiologically influenced corrosion) formation. Costly repairs; contributes to MIC. Reduced water volume starves GPM for chiller operation. Water wasted through overflow at pump shutdown.	Blocked orifices/distribution nozzles. Overflow Interruption of proper flow reducing efficiency. Change in Delta T.	High bleed off leads to waste of water, increasing cost. Also requires more treatment products to be used in system. Low bleed off can often lead to improper water treatment balance. Enviromental problems and restriction of discharge.
Solutions	For fouling in media a comprehensive water treatment program will address the biologicals with biocides; and scale, mud and silt through a proper combination of dispersants, bleed-off and in some cases filtration. Damaged media; consider replacement. Lack of proper air flow; check fan operation and speed, and distances of physical blockages that may be restricting air flow and make corrective adjustments where possible.	If VFD check for proper application, check for mechanical problems with pumps, consult engineering data for proper sizing. Isolate and chemically clean the chiller. Mechanically clean chiller tubes. Improve water chemistry to prevent future problems. Add filters. Clean strainers.	Lower water level; improve water make-up to prevent fluxation of pump supply. Improve biological program. Improve inhibitor program. Correct water volume supply. Regularly check for proper operation and balance makeup water with tower operation.	Improve biocide, descaling and corrosion inhibitor program to limit future issues. Manually remove debris that has entered hot deck from outside of the system (i.e. leaves, branches, birds) Correctly balance water distribution and make sure the tower is level.	Use higher cycles of concentration program. Develop a balanced program for the system utilizing biodispersants to find the optimized cycles of concentration. Use greener biocides that effectively control bacteria, algae and biomasses; but that biodegrade more readily in the system, eliminating concerns with discharge.