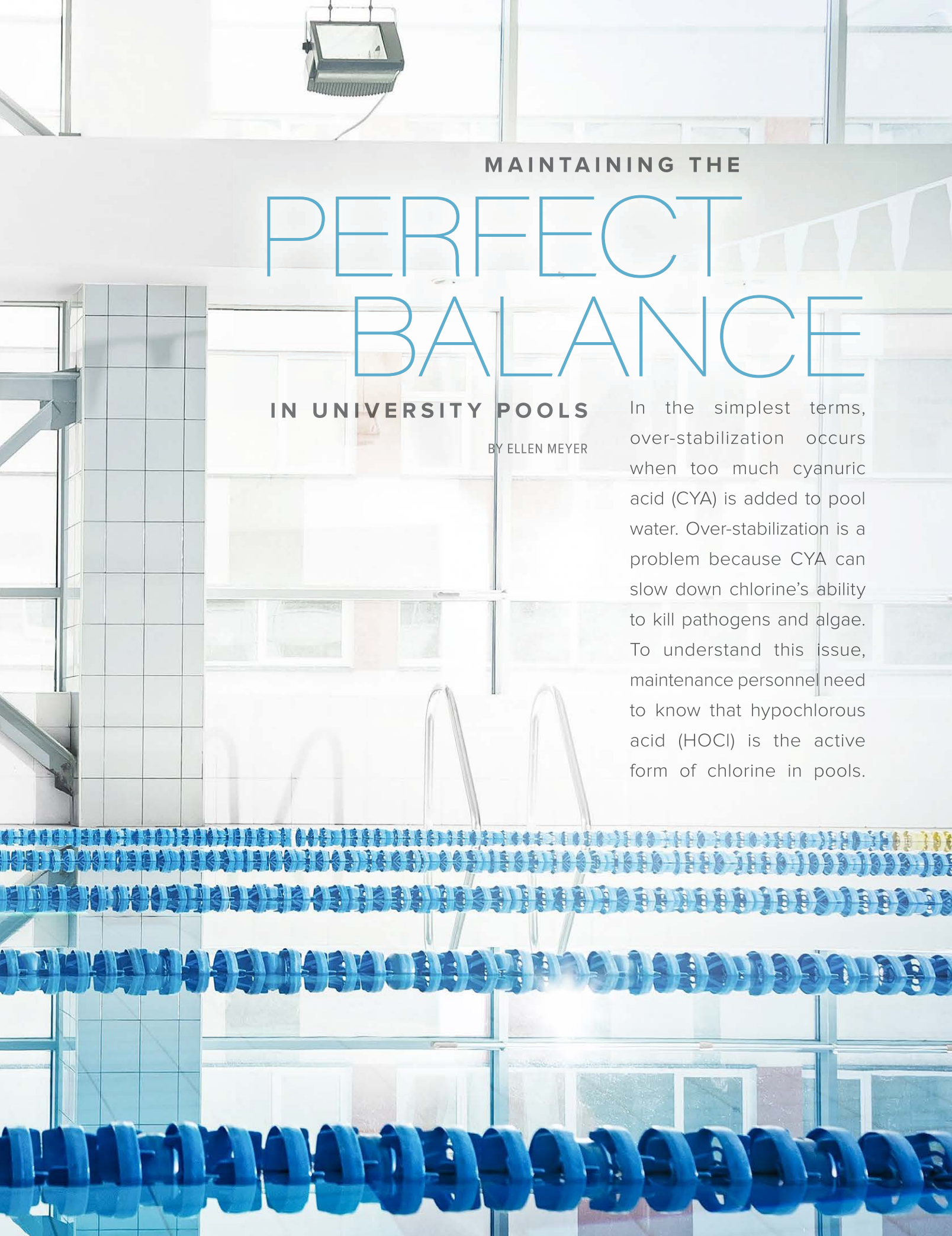

MAINTAINING THE

PERFECT BALANCE

IN UNIVERSITY POOLS

BY ELLEN MEYER

In the simplest terms, over-stabilization occurs when too much cyanuric acid (CYA) is added to pool water. Over-stabilization is a problem because CYA can slow down chlorine's ability to kill pathogens and algae. To understand this issue, maintenance personnel need to know that hypochlorous acid (HOCl) is the active form of chlorine in pools.

The concentration of HOCl is affected by both the pH and the CYA concentration. At low pH, chlorine is in its full active HOCl form. At high pH, chlorine is present as the less active hypochlorite ion. This situation is the primary reason pH must be controlled. Keeping the pH below 7.8 ensures an adequate HOCl concentration is maintained.

Even with very low (<10 ppm) concentrations of CYA, the concentration of active chlorine, or HOCl, is decreased significantly. Both pH and CYA concentrations must be controlled to maintain an effective HOCl concentration. Disinfection rates are typically measured in terms of CT values, where C is the concentration of disinfectant and T is the time needed to inactivate the organism. When increasing CYA concentrations, the CT value increases. With more CYA, the pool will need more time and more disinfectant to kill the bacteria.

Pool Shocking

In a 2004 study performed by Lonza, eight identical 6,800 gallon pools were operated for three months at a test facility in Miami, Florida: two control pools with no CYA, two pools at 25-50 ppm CYA, two pools at 100-125 ppm CYA, and two pools at 200-250 ppm CYA. Algae and synthetic bather load were added to the pools once a week. Each week, two days after the contaminant additions, the pools were shocked with 10 ppm available chlorine using calcium hypochlorite (cal-hypo). Results showed that increasing CYA concentrations led to increased algae counts. The pools with 25-50 CYA had almost twice as many algae as the pools without CYA, and the 100-125 ppm CYA pools had between nine and ten times the algae.

Despite its drawbacks, CYA is a useful tool which stabilizes chlorine so that it is not degraded by sunlight. The challenge becomes understanding how to maintain a chlorine residual without compromising its efficacy. The answer is to use as little CYA as necessary to maintain a chlorine residual and have a way to add un-stabilized chlorine slowly and constantly to the water.

Commercial pools have been using this approach for years. By adding a small amount of CYA to the pool, the chlorine residual is stabilized. Then, un-stabilized products such as chlorine gas, sodium hypochlorite (liquid bleach), or cal-hypo are used to provide a steady source of chlorine. In commercial pools, the chlorine feed is usually performed using feeding equipment and controllers.

Trichlor offers the advantage of being slow dissolving so daily additions of chemicals are not needed, and the equipment needed to feed trichlor to the water—such as a floater or tablet feeder—is simple and inexpensive.

However, for every pound of trichlor added, about half a pound of CYA is added to the pool. With the use of trichlor, CYA concentrations can quickly build up, and chlorine efficacy can be compromised. The un-stabilized sanitizers—cal-hypo and liquid bleach—work great as sanitizers; because they are fast dissolving, however, the equipment needed to feed these products has been more complex and expensive.

The Dangers of Trichlor Tablets in Skimmers

Slow dissolve cal-hypo tablets are now offered on the commercial market, with a formulation tailored to the needs of commercial pools. Although these tablets dissolve very similarly to trichlor tablets, they cannot be used in trichlor feeders. Trichlor and cal-hypo are incompatible, and combining them can be extremely dangerous. Putting both of these tablets into a feeder could cause fire, explosion, and the release of toxic gases, resulting in property damage, injuries, or even death.

For commercial pools, the feeders are designed for use with the slow dissolve cal-hypo tablets. Many pool professionals are wary of putting chlorine tablets in the skimmer. With trichlor, these worries are well founded. The combination of low pH and high chlorine of trichlor tablets can wreak havoc on pumps and other pool equipment. Cal-hypo, on the other hand, has a high pH, so when it is used, the water moving through the equipment will have high chlorine content, but the chlorine is not as active due to the high pH.

Cal-hypo adds calcium to the water. This method can be good for plaster surfaces, but, if left unchecked, too much calcium can lead to scaling and cloudy water. Like CYA from trichlor, calcium must be removed by draining and refilling the water. However, the amount of water needed to correct the calcium addition from cal-hypo is much less than the amount of water needed to correct the CYA addition from trichlor. In addition to this advantage, cal-hypo helps to protect pool plaster due to its calcium content and high pH.

In summary, workers who are maintaining the chlorine residual with trichlor or shocking with dichlor are not only adding chlorine to the pool, but they are also adding CYA. CYA hinders chlorine efficacy and should be maintained at the lowest concentration needed to maintain a chlorine residual. Slow dissolve cal-hypo tablets are now available that offer the convenience of trichlor, without the CYA. These tablets and the proprietary, slow-dissolving technology in them are long lasting and leave no trace of CYA.

This non-stabilized chemistry helps to avoid over-stabilization by giving maintenance personnel the choices of how much CYA to add and when. With slow-dissolving cal-hypo tablets, users no longer need to choose between convenience and efficacy.

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