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COMBINED EFFORT

Mixing state-of-the-art technology with old-fashioned chlorine is key to proper water treatment in aquatic facilities. **BY STEVE KENNY**

Perfectly polished water contained in a public or commercial swimming pool can be wonderfully inviting. It's ultimately the reason pools and spas exist; humans feel good in clean water. Unfortunately, water that's left insufficiently treated can have the opposite effect. My many years as a swimming pool service/water chemistry professional has led me to firmly believe that water treatment in many aquatic facilities is not only badly antiquated, but far too often potentially harmful.

Much of the issue boils down to the presence of compounds known as chloramines. Also known as combined chlorine, the terms represent a family of compounds comprised of used chlorine that has combined with ammonia molecules after killing germs and oxidizing organic compounds, such as those found in urine, sweat, saliva and suntan lotion, among many others.

Chloramines are the cause of the chlorine smell, which ironically is typically associated with over-chlorination, though that couldn't be farther from the truth. Pools that smell bad are not over-chlorinated, but under-chlorinated — or more accurately, inadequately treated.

Chloramines not only smell bad, these nasty compounds are also highly corrosive and can contribute to ruining everything from swimmers' teeth to the ducting in an HVAC system. And, they are also widely associated with respiratory problems, especially in high-use indoor aquatic facilities — an issue that has been addressed by the Centers for Disease Control and Prevention, and a topic covered in the Model Aquatic Health Code.

PHOTO BY ERNEST R. PRIM/SHUTTERSTOCK

Ironically, because most people associate the smell with too much chlorine, some actually view the odor as a good thing — the odor is evidence the water is chlorinated and therefore safe. In fact, the presence of chloramines not only can lead to respiratory problems, it can also mean the water is not adequately sanitized of potentially harmful pathogens.

Service providers typically deal with chloramines in pools and spas by shocking the water with large doses of chlorine to achieve what is known as breakpoint chlorination, meaning the residual of free-available chlorine reaches 10 times the concentration of the chloramines, causing them to break apart by way of oxidation. The problem with that approach is that it requires the use of large quantities of chlorine or other shock treatments, and the pool has to be closed during the procedure. It is also expensive, time consuming and ultimately unnecessary.

Rather than deal with chloramines after the fact, the far better way to address the issue is to prevent their buildup in the first place.

UV AND OZONE

In my work as a pool builder and service provider, I advocate an approach that combines treatment systems to create synergistic effects where the technologies benefit each other. Specifically, I favor using a combination of corona discharge ozone systems and UV sanitation devices, along with radically reduced chlorine levels. Ozone handles the oxidation task, destroying organic compounds (such as chloramines) that fuel the development of bacteria. The UV system shreds the bacteria, preventing it from mutating, while the chlorine plays a supporting role as a constant sanitizing residual.

When people ask me which technology is better, I always say it's the combination of the three that provides optimum results, a practical philosophy that comes as new to many, even though UV and ozone systems have been around for decades. Some also find it surprising that I'm not advocating

SWIM TEAM
A combined water treatment effort can eliminate problems associated with high chlorine levels.

PHOTO BY SUSAN LEGGETT/SHUTTERSTOCK

Chloramines not only SMELL BAD, these nasty compounds are also HIGHLY CORROSIVE and can CONTRIBUTE TO RUINING EVERYTHING from swimmers' teeth to the ducting in an HVAC system.

eliminating chlorine altogether, an idea that has become popular among many of our residential clients. Not only is chlorine extremely beneficial in small doses, the law requires it.

Commercial pools in Long Island, N.Y., for example, when using secondary disinfectant such as ozone or UV, are required by the health department to have a minimum constant chlorine level of .6 parts per million. By contrast, it's not usual for pools using only chlorine to be maintained at much high concentrations, which in turn contributes to the build-up of chloramines and other byproducts, as well as necessitating routine water balance adjustments.

With the combined treatment approach, problems associated with high chlorine levels are eliminated, while corrosive or scaling source water is much easier to manage. The ozone system is there to maintain a constant oxidation-reduction potential (ORP), and therefore is constantly oxidizing the unwanted compounds. In turn, this makes the UVT (ultraviolet transparency) of the water perfect for the UV system to shred the DNA or harmful bacteria and prevent them from mutating.

BAD BUGS

That leads to the other part of this discussion, which involves the presence of highly chlorine-resistant pathogens, namely the diabolical *cryptosporidium*, a nasty organism that has caused a number of highly publicized outbreaks resulting in severe and even fatal gastrointestinal problems. A big part of the problem is that chlorine does not kill crypto, at least not at the chlorine concentrations found in pools. The organism is, however, readily handled by properly sized ozone and UV systems.

In essence, commercial pool facilities that rely solely on chlorine, especially those used by large numbers of bathers, are at constant risk of an outbreak, which can only be diagnosed long after the contaminated water has been ingested. Such was the case in 2005 at the Seneca Lake State Park in upstate New York, where a mind-boggling 1,800 individuals became ill from playing in a single infected spray pad.

Facility managers, operators and servicers must take the necessary measures required to prevent these maladies, rather than simply respond to them after facility users get sick. Of course, the primary objection to using ozone and UV systems is the upfront cost. Depending on the size and usage of a pool or spa, costs can be upward of $60,000 or more for both.

What most people don't realize, however, is that the technology offers significant return on investment in the form of dramatically reduced chemical costs, both in terms of the comparatively tiny volume of chlorine required and the reduced need for water mineral balance adjustment.

POOL PROBLEMS HIT HOME

My three kids used to make regular use of our local YMCA's swimming pool for lessons and recreation. Soon after they started swimming at the Y, my wife and I began noticing that all three were coming home with moderate to severe respiratory symptoms: coughing, sneezing and shortness of breath. We didn't take long to realize that the fetid air they were breathing at the Y was causing the problem.

Why were we so sure? First, the facility was redolent with that familiar strong chlorine odor; so much so just walking into the natatorium was nauseating. The water quality was visibly poor with extremely high turbidity, and most damning of all, a large number of the other kids and adults using the facility were experiencing the same symptoms during and after working out in the pool. I also found it very telling that you'd see asthma inhalers scattered around the pool deck — not what one would expect in a building full of swimmers.

It would be easy to chalk our situation up as an isolated incident. Unfortunately, judging by reports from numerous aquatic facilities in recent years, as well as the responses from public agencies, similar problems have become far too commonplace. After eight years of arguing, pleading and letter-writing, we have not yet been successful in convincing the Y to upgrade its system, but the effort continues.

— S.K.

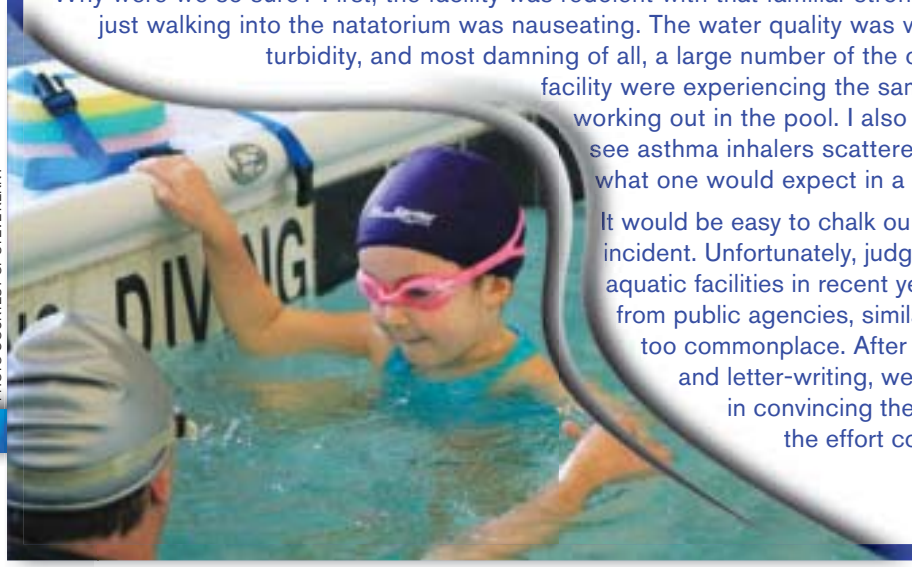

PHOTO COURTESY OF STEVE KENNY

Eliminating the presence of chloramines can dramatically reduce the corrosion of materials that surround the pool, leading to significant savings, while also reducing the required air turnover rate.

More important still, those using the facility, including staff and lifeguards, are not left gasping for air. Instead, the water quality generated by proper treatment with combined technology, along with proper filtration regimens, becomes so appealing it attracts rather than repels customers.

Even with all of those upsides, many facility managers and owners require convincing. But they need to look no further than Yale University, for example. The Ivy League university was forced to close its 80-year-old pool due to air quality issues, but after installing a UV system, not only did the university realize a 75 percent reduction in chlorine use, the water and air quality is now better that it had ever been

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THE FUTURE OF POOL MAINTENANCE

Using remote control technology to monitor and treat water has become increasingly popular. Control system manufacturers have embraced the world of smartphones and laptops to create applications that enable service professionals to monitor and operate treatment systems similar to what is done at a water treatment plant.

I use such a system to stay ahead of maintenance concerns for dozens of our service clients. No longer is it necessary to physically travel to a facility to determine pH and sanitizer levels, along with water temperature and total dissolved solids. I can see what's happening at any of our clients' pools and spas in real-time from any location that has cell service, thus preventing possible health-related issues and/or downtime.

— S.K.