

► [Insider Deals](#) ► [Submit RFPs/Bids](#) ► [Request Literature](#) ► [Subscribe](#)

A Look At UV Water Treatment

Posted on [March 6, 2014](#)

Article Author: Jeff Boynton

Spas are a favorite water pastime and present in many recreational aquatic facilities, especially those with that offer hydrotherapy treatment. However, the warm water is also a breeding center for many water-borne micro-organisms. And the warm water has more evaporation than drinking water thereby making the halogen treatment more volatile. Today, Ultraviolet water treatment for spas is gaining use more and more as a valid alternative for water treatment in recreational spa facilities as it adds NOTHING to the water while keeping water clean and improving the air quality around the unit.

Recreational aquatic facilities are turning to UV water treatment not only because of local health requirements but also because of their ease of use, reduced chemical consumption, health advantages, and environmentally friendly benefits. As UV treats the water that passes through the UV Light Chamber and does not add anything to the water such as ozone or chlorine gas, the resulting water treatment is not corrosive or damaging to the spa equipment. Since the total water volume of a spa is turned-over in a relatively short period of time through the filtration and UV cycle, the warm spa water is frequently sanitized.

UV Water treatment is based on using the power of germicidal light to disinfect the water thereby consuming less chemicals and allowing them to be more effective. UV-C eradicates micro-organisms that pass through the UV Light chamber, but it does not act as a residual. UV Light Technology only works on the water flowing through the Light Chamber; it does need chemical sanitizers, but only in low concentrations since the UV Light is doing the bulk of the work. Less chemicals that are more effective since they are not consumed treating micro-organisms that the Clean light has already eradicated. Reducing chemicals means cleaner, less aggressive water that is easier to balance.

What is UV?

Ultraviolet radiation is an invisible light emitted from the sun. Over 100 years ago European scientists from different countries discovered the top surface of lake-water was sterile when exposed to sunlight. Investigation led to the discovery of Ultraviolet light and to the invention of UV bulbs. Ultraviolet (UV) light is situated in the electro-magnetic spectrum between X-rays and visible light. UV light is split into four main categories, UV-A,

UV-B, UV-C and Vacuum UV. The area between 240 and 280 nanometers (nm) is UV-C, commonly known as germicidal light. This is the UV light that is used to sanitize spas and hot-tubs.

How does UV Sanitize water/ improve water quality?

UV-C light has the ability to cause permanent damage to a wide variety of microorganisms in water. Certain species of microorganisms, such as Legionella, and the news-making protozoa Cryptosporidium, are not completely sanitized with traditional disinfection techniques such as chlorine. UV-C light is not a biocide but disrupts the micro-organisms DNA ensuring that organisms present in water are unable to replicate and remain inert. All germs, virus, bacteria, etc., are thus de-activated and can no longer reproduce. Unlike other sanitation treatments, UV does not affect the taste, color, or pH of the water being disinfected.

In a UV sanitation system, the spa water circulates directly through the exposure of the UV lamp in the Light Chamber, allowing the radiation to eliminate protozoans, virus, and bacteria. UV has gained traction in part because of its ability to eliminate chlorine-resistant microorganisms such as Legionella, Giardia and Cryptosporidium, which are common causes of multiple pool and spa closures nationwide.

Choosing UV to improve water and air quality

We all know that spa water must be sanitized and clean. Moreover, the warm water in spas must be treated with chemicals continuously in order to de-activate pathogenic microorganisms and to prevent the spread of waterborne illness. Unfortunately, chemicals such as bromine and chlorine, react with organic and mineral compounds, resulting in harmful and smelly by-products.

Ensuring good water chemistry is the key to maintaining a proper and safe spa-soaking environment. Not only to maintain a good level of oxidizers but also to correctly monitor pH, water hardness, alkalinity etc. However there are only a few options available to spa operators looking to offer healthy water while reducing the dependence on chemical consumption. The 5 available techniques are: maintaining high levels of chlorine (between 3 to 5 ppm), non-chlorine shocking, ozone, adding fresh water, or installing an ultraviolet sanitizing system.

“Prevention” and a “Good Filter” go a great way in helping the filtration system be effective. Outside contaminants enter spas when bathers introduce ammonia and organic compounds when not showering prior and using the spa as a bathtub. Spas and hot-tubs are inherently used for leisure and fun, but combined with warm water, proper sanitization is a must.

A good filter is key: It is always possible to enhance the filter, such as by adding granulated activated carbon, will help remove chloramines and ammonia. Filtering is critical in spa sanitation and may require additional attention and manipulation.

Adding a UV System:

Remember that UV-C doesn't change the pH, turbidity or alkalinity of the treated water. Outside of UV Light, this treatment does not add any gases or chemicals to the water. Therefore, DBPs are not formed either. Thus the two main benefits to UV over the other options are that (1) UV damages DNA/RNA at a wavelength of 254 nm so water is sanitized, and, (2) studies show that repeated passages through both medium and low pressure

bulbs decrease chloramine levels down to ranges acceptable to health organization guidelines.

While ozone has shown good results in removing chloramines, it is nonetheless a gas that is injected into the water that needs to be fine-tuned and controlled. Ozone is very effective as an oxidizer that in high doses is rather corrosive compared with UV systems.

Many hot-tubs currently offer UV Clean Light Technology™ as an option for sanitizing spa water. In Residential units these are generally low-pressure UV technology, while in Commercial spa use, medium pressure bulb technology is also used. The volume of water in conjunction with the volume of bathers needs to be considered with the turnover rate of water flow to properly size the UV unit. If you are thinking about pursuing the UV path, there are a couple of things to consider as all UV systems are not created equal. Are they properly designed to deliver the UV dose necessary to eradicate the water-borne micro-organisms? Are the units energy efficient? A reliable UV system is designed to handle a maximum flow rate. Check with your UV manufacturer about their certifications.

Choosing the right UV System

But not all UV is the same. It is important to determine the correct sizing of the UV unit for the type of spa and its use. Water flow is a major factor in determining the size of the unit. And how often the water is turned over each hour is important in properly sizing the UV treatment. Also, does the spa use a circulation pump in addition to the pumps for the jets?

The obvious health benefits of UV water treatment using less chemical and providing a safer bathing environment have made the option of UV treatment for spas very attractive. It is good to know that by providing a facility with better air and water quality plus you'll be able to say you are lowering your carbon and water footprint on a planet—which is good for you and planet earth!

In North America, the standard protocol for water quality maintenance (WQM) is premised on the assumption that appropriate filtration and residual halogen disinfection will inactivate all pathogens. However we now know that:

- “Giardia can take up to 45 minutes to become deactivated in chlorine”
- “Noro virus takes about 30-60 minutes to deactivate”
- “Crypto is highly resistant to chlorine and can linger in a pool for up to 10 days”

(refer to Inactivation time for human disease – causing microbes in chlorinated water.

www.cdc.gov/healthyswimming)

Unfortunately Recreational Water Illness (RWI) is dramatically increasing. Research has also shown that halogen disinfection creates hazardous by-products (DBP's). These DBP's include [chloramines](#), THM, HAA, and other contaminants that are recognized to have serious negative health effects. It is also established that certain pathogens are resistant to chlorine and ozone, thus leading to various diseases including respiratory, skin and gastro intestinal problems. Awareness and concern about exposure to DBP's in pool and spas is increasing at an alarming rate. Health officials have acknowledged that the increase of RWI and negative health effects

associated to DBP's necessitates a paradigm shift in our thinking about how we treat pool and spa water.

Experts agree that moving beyond the basics will require revising the two pillars approach that includes filtration and halogen followed by adopting supplemental disinfection for water quality management for pools and spas.

In-line UV disinfection is recognized as an extremely effective and reliable method for deactivating pathogens in the water and reducing the bathers exposure to DBP's.

In some areas, chemically laden pool or spa water cannot be put to waste as it goes directly through the aquifers and could contaminate the ground water. Water that is treated with UV Light usually has drastically reduced chemical levels and can safely be drained.

Now is the time to consider a UV system to improve both the water quality and the air quality of spas and hot-tubs.

Jeff Boynton is the Director of Sales and Marketing for Delta Ultraviolet Solutions, "Safer for you, better for the Environment"™ based in Gardena, GA. Delta UV provides the most complete and advanced "clean light" technology available for eradication of micro-organisms and [chloramine](#) removal for swimming pools and spas. As one of the world leaders in ultraviolet sanitation solutions, Delta UV offers a full product line of NSF-50 certified products for every sized pool and spa. Delta UV is a division of Bio-UV based in France which has 14 years of experience treating everything from swimming pool and spa water to industrial water run-off as well as providing drinking water solutions to third world countries throughout the globe. More information can be found at www.deltauv.com and at www.bio-uv.com