

# AQUATICS

INTERNATIONAL

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SEPTEMBER 2008 | VOL 20, NO 8

## Crypto Proof?

Not quite, but research shows precoat filtration removes nearly 100 percent of the hard-to-kill parasite. Find out how the others compare. | by Kimberly Walsh, EP Minerals

**C**ryptosporidium, or crypto as it is often called, has become the leading cause of recreational water illnesses in the United States, according to surveillance reports published by the Centers for Disease Control and Prevention in Atlanta.

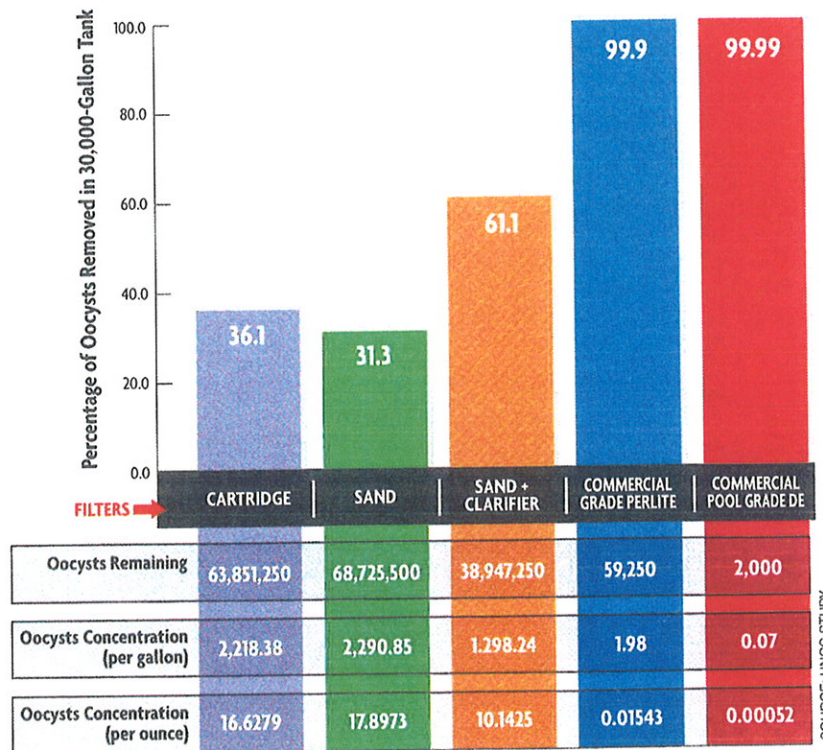
The second largest outbreak ever reported occurred in summer 2005, resulting in more than 3,000 people becoming ill and a class action lawsuit being filed against the state of New York. More recently, a ban was imposed last summer on children under the age of 5 from swimming in public pools in the Salt Lake City area.

It is evident that new solutions must be identified to help reduce the potential for RWIs. In an effort to understand the removal rates provided by current industry standard filters, a study was conducted at the University of North Carolina at Charlotte by Dr. James Amburgey, a well-known researcher within the industry. Research concluded that precoat filtration using diatomaceous earth (DE) and perlite filter media removed up to 99.998 percent of the *cryptosporidium* in a single pass through industry standard filters. That compares with 31.3 percent for sand and 36.1 percent for cartridge filters.

To understand why this is so important, it's necessary to understand how *crypto* does its dirty work. The parasite can cause gastrointestinal illness, and symptoms include diarrhea, vomiting, fever and abdominal cramps. It can also be potentially lethal for individuals suffering from compromised immune systems. Infection is transmitted via a fecal-oral

### FILTRATION COMPARISON

This chart illustrates a hypothetical example of a single outbreak in a 30,000-gallon pool using filtration removal rates from the UNCC study. Keep in mind, a single outbreak is about 100 million oocysts. Only DE and perlite filtration provided sufficient removal to reduce the final oocyst concentration to the level at which infection would be unlikely to occur.



route, usually ingesting (drinking) fecal contaminated pool water. After ingestion, the oocysts have an incubation period of two to 14 days before symptoms become apparent.

Unlike other parasites, *cryptosporidium* is largely resistant to traditional chemical defenses, such as chlorine and other disinfecting agents, due to the thick protective oocyst wall. In addition, a *crypto* oocyst can survive in a properly maintained pool for months, which increases the likelihood of an outbreak in your pool.

So how many oocysts could there be in a pool at a given time? Unfortunately, it only takes approximately 0.1 grams of fecal matter to shed 100 million infectious oocysts into the pool. A typical oocyst is approximately 4 to 6 microns in diameter and cannot be detected by the human eye. If you were to line up 20 oocysts end to end, it would be the width of a human hair.

Removal thus becomes a key line of defense. The small size of the oocyst combined with its ability to deform during filtration traditionally has made removal via filtration challenging because most commercial pools today use sand filters, which generally are only capable of removing particles down to 30 microns. Alternatively, precoat filtration can remove particles down to 1.0 micron, which leads to increased *crypto* removal, as the UNCC study demonstrated.

*Crypto*'s high shedding density coupled with a low infectious dose makes it a serious health threat. Research suggests that ingesting

as few as 10 oocysts can cause infection in a healthy person. Some other findings:

■ Children drink on average approximately 1.6 ounces of water when swimming, while adults drink half that, according to recent research conducted by Dr. Alfred Dufour.

■ The potential for infection is greatly diminished if you ingest 10 or fewer oocysts, according to CDC recommendations and research by Chapelle. This represents a concentration range of 0.625 to 6.25 oocysts per ounce in the pool, based on average water consumption by children as determined by Dufour.

Removal rates become even more important as the volume of the pool diminishes, such as with sprayparks, wading pools and therapeutic pools because there is less water to dilute the single outbreak occurrence. Sprayparks, for example, are one of the fastest-growing attractions at many waterparks; however, the volume of water in circulation is significantly smaller than in a 50,000-gallon pool. The odds of infection in a spraypark become significantly higher, as was evidenced by the 2005 outbreak in the state of New York.

Removal rates in excess of 99.9 percent, achieved by precoat filtration with DE and perlite, will go a long way in protecting the public from *cryptosporidium* in any water venue. DE filtration is not a new tool for removing *crypto*. This is one of the Environmental Protection Agency's best available technologies to remove the parasite from drinking water originating from surface

water sources. It's used in surface-water treatment plants throughout the world today to provide safe, clean drinking water. The research conducted by UNCC supports the idea that recreational water can be as safe from *cryptosporidium* as drinking water using industry standard precoat filters in a recreational water environment.

Some might challenge the use of DE or perlite filtration as dangerous. However, it comes down to putting everything into perspective. DE filter media does contain crystalline silica. Prolonged inhalation of fine crystalline silica dust (such as in sand-blasting) can cause damage to the lungs, and has been linked to cancer.

However, crystalline silica is one of the most abundant minerals on earth. It is most commonly found in the form of quartz or sand — it's everywhere, including your sand filter. Due to the limited exposure in quantity and time to respirable silica dust when charging a precoat filter, any risk of illness is extremely unlikely. Still, it's recommended that a dust mask be worn when handling any dusty mineral product, be it DE, perlite, or sand. Perlite filter media does not contain respirable crystalline silica. Many of the chemicals a pool operator uses every day present some hazard. However, proper use of the chemicals, including DE, makes them safe to handle, and their use improves water quality and safety.

Ultimately, precoat filtration with either DE or perlite will protect the water quality and health of all swimmers.